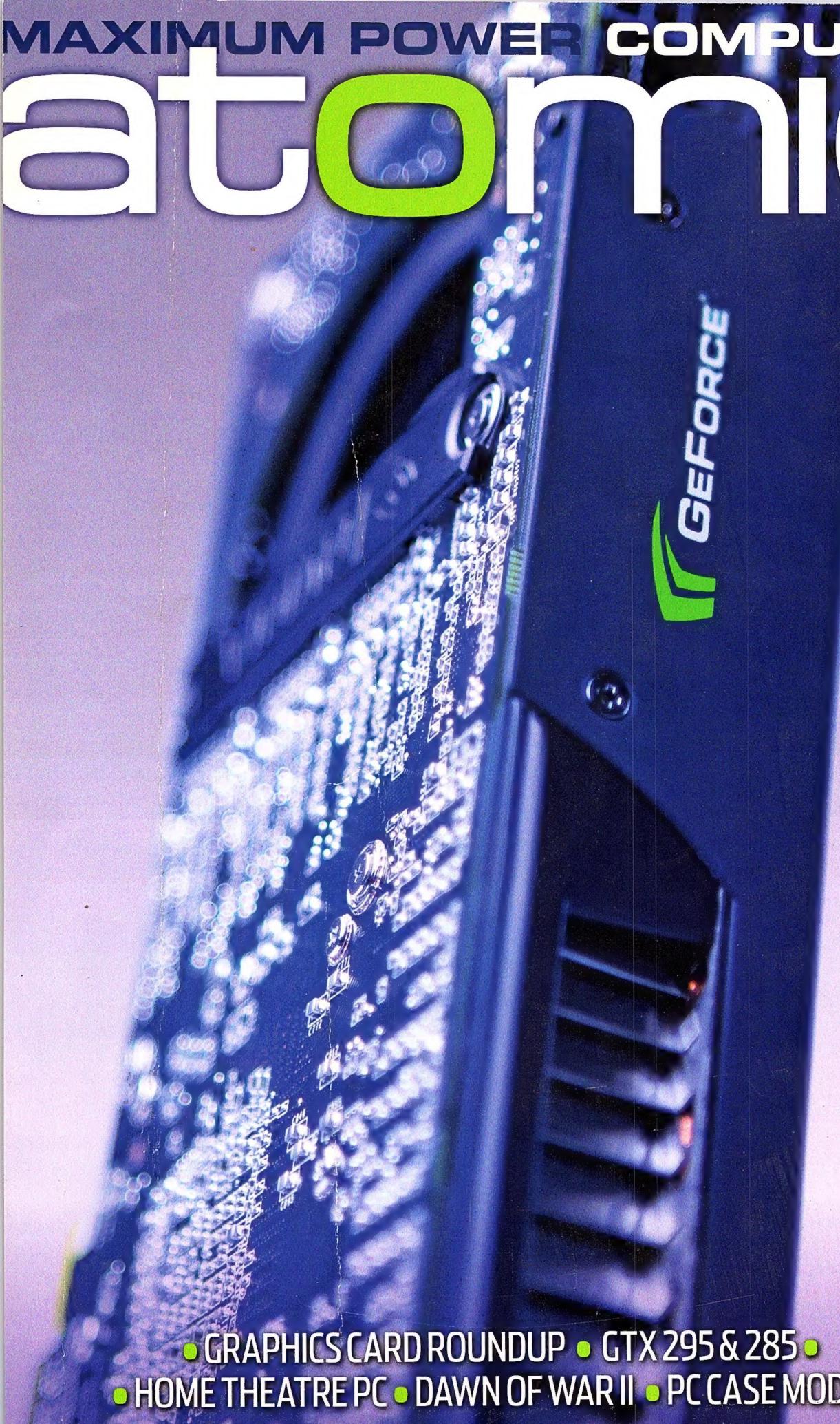


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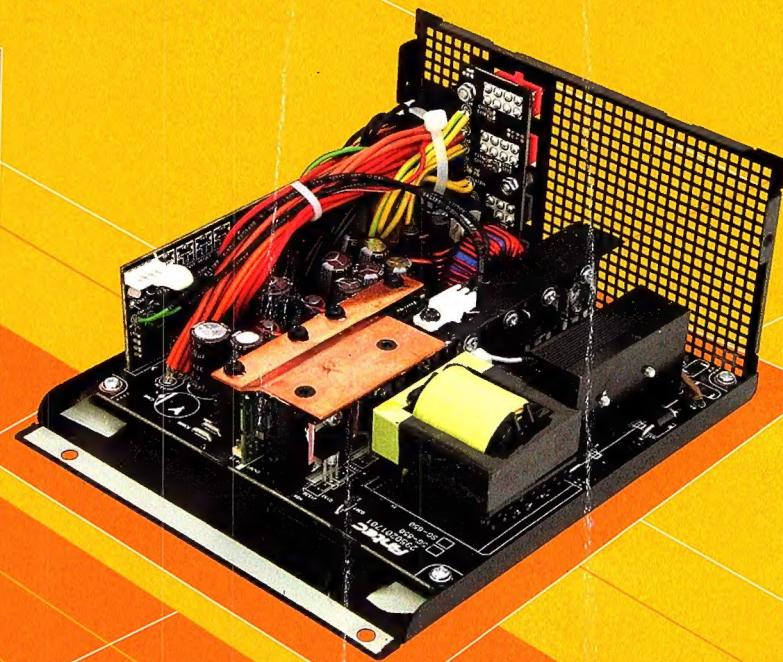
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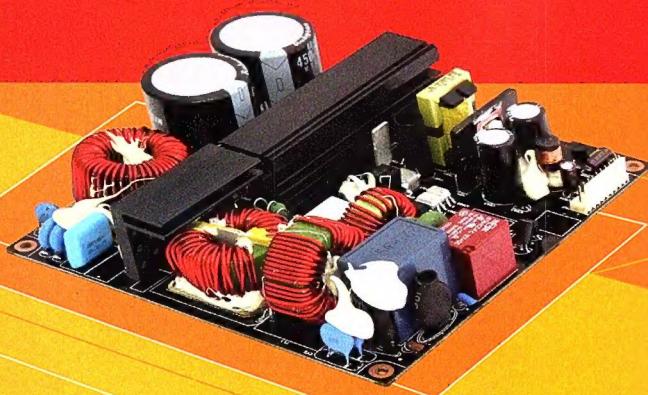
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# EDHEAD

## Big Things are afoot

First and foremost, I want you all to do a little math.

This is issue 98 of what I hope is your favourite computer magazine. It shouldn't take much effort to therefore work out that very soon, Atomic is going to reach a pretty impressive milestone.

One hundred issues.

That alone I think (though, of course, I may be a touch biased) is cause for celebration, but we're going to ramp things up towards that mighty 100th issue, and part of that is the ultimate Atomic reader's poll. We've got all the details on page ten, so be sure to catch up on the Atomic HOT 100, as well as a few other things we have planned to help us – and you, our readers – celebrate this great occasion.

And that's not the only reason to put on your party pants this issue!

If you're a Dawn of War fan, we have what may be the ULTIMATE giveaway. THQ and Atomic is very proud offer a truly one-of-a-kind prize – a life-size, eight-foot tall Space Marine statue, complete with Bolt Pistol and Chainsword. It's a prize so cool I'm tempted to spam entries myself! For more details, just check out page 87 (and don't forget our full preview of the game a few pages later – hint: it rocks!).

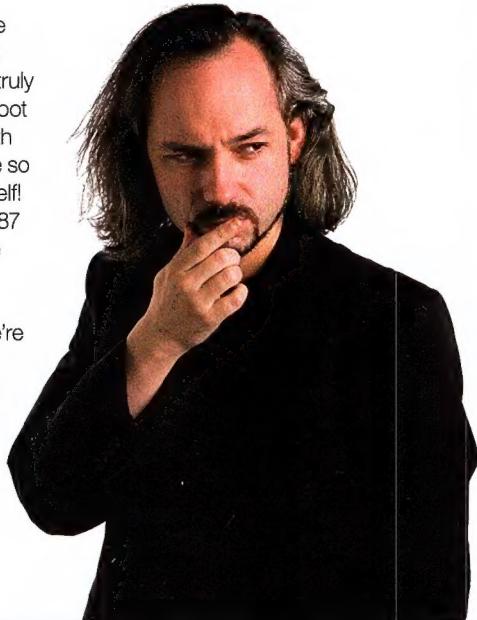
And speaking of Dawn of War 2, we're going through a pretty interesting phenomenon when it comes to game releases this year. This time a year ago, we were stuck in a real dead zone after the Xmas glut; there was practically nothing worth looking at or getting excited about (unless Barbie accessorisation games are your thing – they're not mine).

This year though, we've got a mess of cool games coming out – DoW2, Empire: Total War, the new Stormrise, exciting DLC for Fallout 3 (we're enjoying Operation: Anchorage as we speak. Or type. You get the point) and GTA IV... will it ever end? We hope not.

And all of this on top of the news that the games industry is one of the few parts of the global economy that isn't getting its balls kicked up where the sun don't shine. Which actually means, that while other industries shrink, our favourite one is only going to expand and get better.

Well, expand, anyway. We're still not sure about those damned Barbie games.

David Hollingworth  
[dhollingworth@atomicmpc.com.au](mailto:dhollingworth@atomicmpc.com.au)



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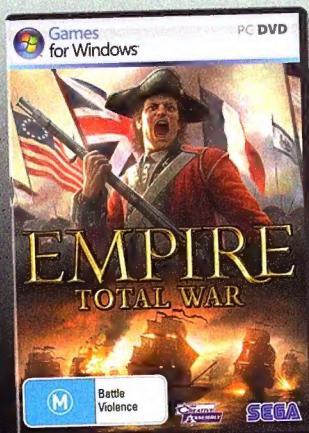
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The very best enthusiast gear.

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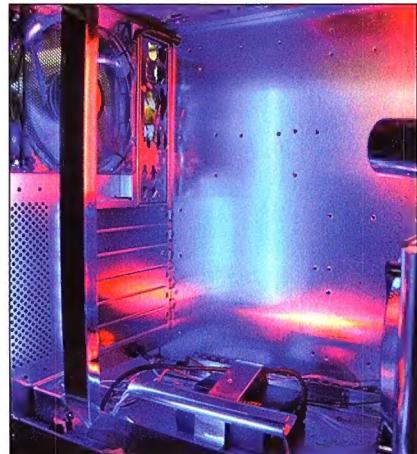
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## WIN THIS! see p. 87



# Prepare for the Atomic Hot 100!

In honour of our 100th issue, we want to celebrate the tech and games that have helped make those 100 issues just fly by. And we want your help, Atomicans!

We want to find out what your favourite games, tech companies and forum moments are. We've got ten categories, and we're going to collate the ten best in each – to give us 100 of the best things EVAR. Your best. So, without wasting any more time, here they are:

We want you to think hard about who or what best deserves your vote. This is a once in a... well, a once in a 100 issues event, so the winners will long live in fame (or, perhaps infamy). To vote, simply get yourself along to [www.atomicmpc.com.au](http://www.atomicmpc.com.au), and follow the links.

And, if you know people who used to read Atomic, but don't anymore... get them to come along too! We want to everyone ever interested in Atomic to help us make this the ultimate list of the best in tech, gaming and our community.

The final 100 will be published in the 100th issue, and posted online.

Plus, we've got some very unique and – hopefully – exciting prizes to offer lucky pollsters. Fancy an Atomic t-shirt signed by every editor of the magazine? Yeah, we can cover that. Want to spend a day in the office at Atomic HQ, playing with the latest tech, reviewing hardware, and hanging out with the Atomic team as they do their stuff? Your dream of seeing your name in print may come true.

Don't miss out on being a part of history! For more news of our celebrations for this momentous event, keep an eye on the next issue and on the website.

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## CATEGORIES

### Best Action Game

First Person Shooter, Fighting Game etc. Anything with a bit of biffo.

### Best Strategy Game

Real Time Strategy, turn-based strategy, grand sims like the Civs.

### Best Roleplaying Game

What's your poison – Zork or Warcraft?

### Best Motherboard manufacturer

Keep in mind not only the quality of the gear, but also support and innovation, and support of the enthusiast community.

### Best Atomican of All Time

Apart from David Hollingworth, of course...

### Best Games Developer

Think of overall quality, skill and innovation. We expect no votes for Ion Storm!

### Best Atomic Feature

There's been hundreds of great articles in the mag – what are your favourites?

### Best Atomic Forum Thread

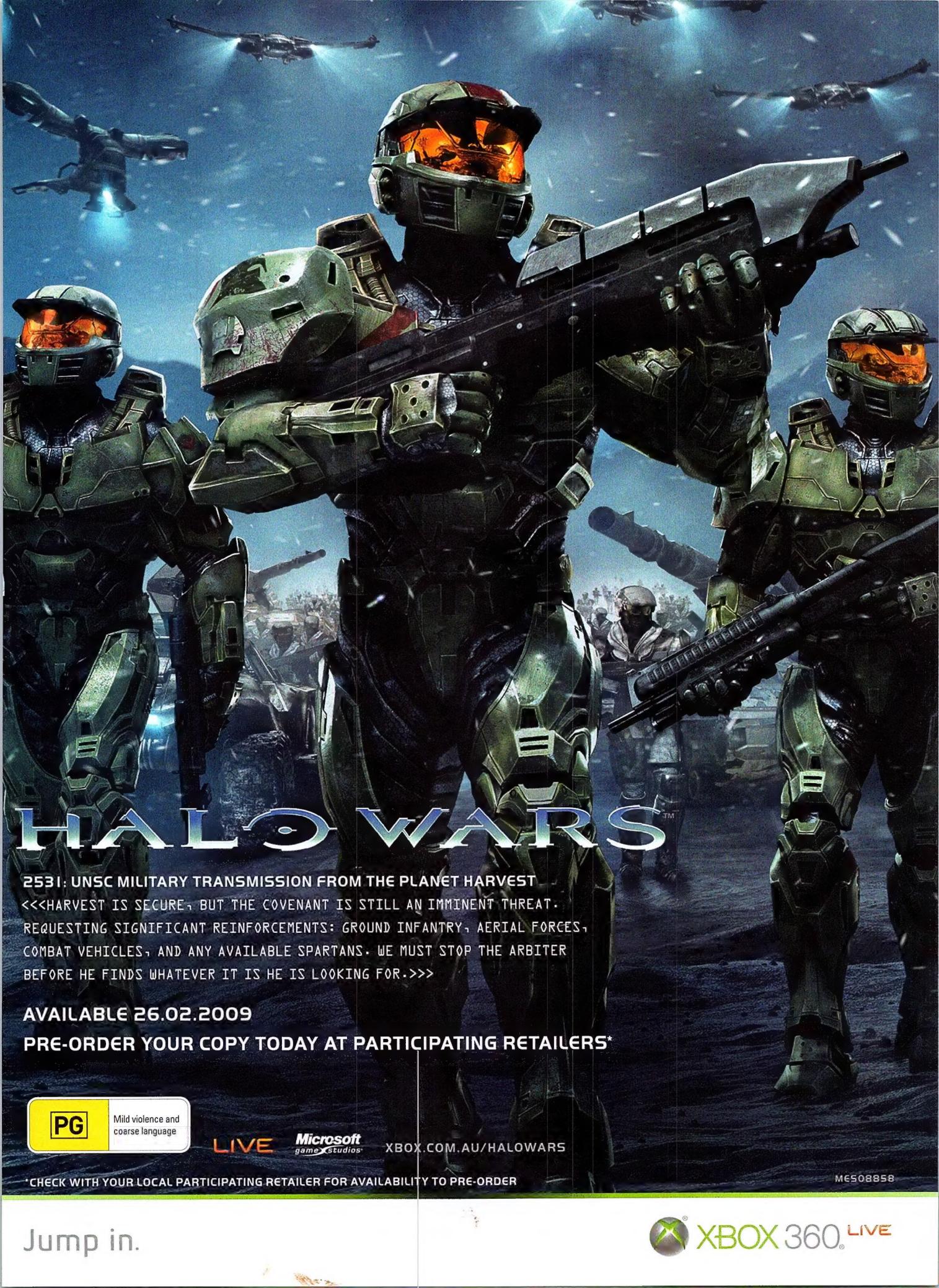
One for the old timers!

### Best Atomic Writer

Some of the best tech writers in the world have written for Atomic. Let's celebrate them.

### Best Graphics Card manufacturer

Without these pixel pushers, gaming would be... lame. Forget the NVIDIA/ATI wars, we want to know about vendors – Gigabyte, ASUS, XFX... who makes the best?



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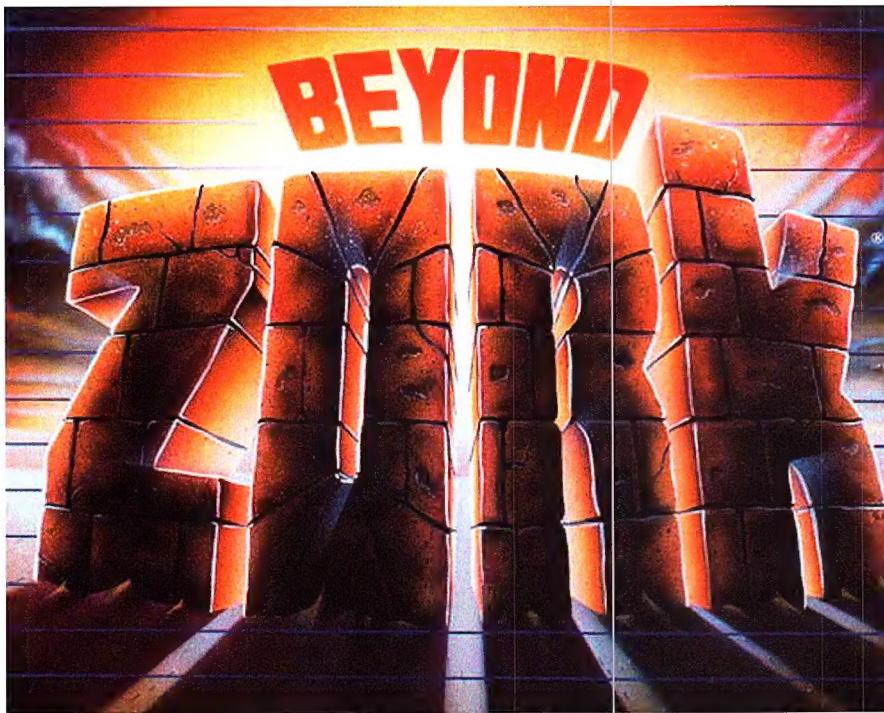
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# Classic gaming lives again

Zork to return as browser MMO!

If you're an old hand at the gaming scene, you'll no doubt remember one of the father figures of early text-based adventure games – Zork.

Originally published by Infocom for such classic hardware beasts as the Commodore 64 and Apple II, Jolt Online Gaming has announced that they'll be re-creating the classic adventures of Zork through a new Legends of Zork title providing a persistent online adventure playable from any Internet browser. Players will take up the role of a recently laid-off salesman and part-time treasure hunter, tasked with exploring

the great underground empire of Zork for fame and glory.

Jolt Online CEO Dylan Collins seems particularly chuffed with the whole concept, "as a complete Zork geek, I'm very proud to be releasing this title" he stated. "Anyone who plays MMOs will definitely like to spend some time with Legends of Zork while they're taking a break or browsing around the web. It's very addictive".

As long as there's a Grue or two, we'll be happy to give this a bash.

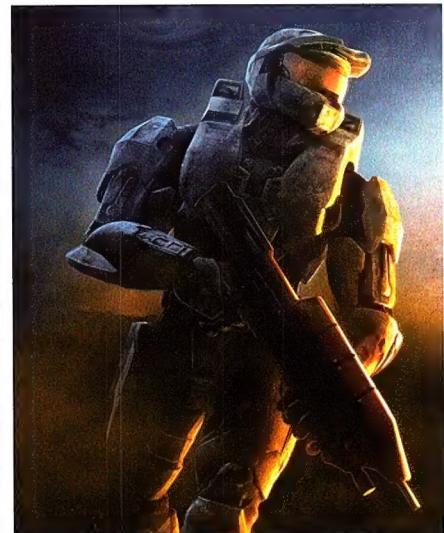
# Halo of craziness

Defence rolls out insanity plea for Halo 3 killer.

Revenge – not insanity – has been ruled the motive for a US teenager killing of his mother and wounding of his father after they took away his copy of Halo 3. The defence team for 17-year-old Daniel Petric argued that the youth's extreme addiction to Halo 3 had made him insane and he couldn't be held responsible for his actions.

We personally think there's potential to the insanity plea, I mean really – getting that worked up over Halo 3? There are far better FPS titles out there. Obviously he's a few Xbox's short of a System Link but the judge has rejected all notions of insanity claiming Daniel had planned the revenge for weeks.

Strangely, the judge also believed that the defendant "had no idea at the time he hatched the plot that if he killed his parents, they would be dead forever." He was expecting them to respawn when exactly?



**Poor old Xbox 360, such a promising console so plagued by shitty hardware faults that make you want to take Bill Gates out to a remote desert location and smack him repeatedly with an Xbox D-pad.** It seemed like we were finally seeing a noticeable decline in instances of the RROD (Red Ring of Death) in the console, only to discover it's now being plagued by the recurrence of an old – and very fatal – error, the E74. During gameplay you may start to notice crazy graphical glitches and errors on your TV, not unlike when your graphics card overheats on a desktop PC. Wavy lines and snowy artefacts abound before your Xbox finally gives up the ghost entirely. Another black mark against an otherwise top gaming machine, let's hope Microsoft get on top of this quicker than the RROD mess.



**Are there gamers out there so casual that they'd be happy to watch a game play itself rather than interact much at all?** Nintendo thinks so, and is working on a gameplay system where a title is treated almost like a full-length cut scene, with players jumping in and out of the action whenever they wanted. Supposedly this will curb the habit of casual gamers to take a break from a game then lose interest, or hit a difficult stage and give in. Personally, we think this is just plain weird and has about as much appeal as munching on wet socks. Or letting them munch themselves.

# Fusion Render Platform

AMD to deliver high definition multimedia to consumers via clouds.

James Matson is distressingly confused.

AMD is no stranger to supercomputers; its hardware powers some of the biggest and most powerful machines in the supercomputer TOP500 project list, with the number 1 beast – the IBM Roadrunner – comprised of 12,960 IBM PowerXCell 8i and 6,480 AMD Opteron dual-core CPUs.

At the International CES (Consumer Electronics Show) held recently in Las Vegas, AMD President and Chief Executive Officer Dirk Meyer announced that AMD will no longer be content supplying the parts for supercomputers, it's actually going to build its own,

"Seven out of ten of the world's fastest machines, including the fastest two computers

**... the system is designed to enable content providers to deliver video games, PC applications and other graphically intense services...**

on the planet, are powered by AMD hardware," said Meyer. "Today, AMD is pleased to announce a new kind of supercomputer unlike any other ever built. It is being designed to break the one petaFLOPS barrier, and we anticipate it to be the fastest graphics supercomputer ever."

Oh yeah, now that's what we like to hear. As is the norm for any company talking about the Next Big Thing™ concrete tech specs are thin on the ground, but we do know that AMD intends to build the cluster out of 1,000 or more GPUs, combining to form the 'Fusion Render Platform' which – despite its aromatherapy sounding name – will be capable of processing over a million compute threads simultaneously. But what's the point of AMD rolling out this graphical powerhouse?

According to the chip manufacturer, the system is designed to enable content providers to deliver video games, PC applications and other graphically intensive services through the Internet 'cloud' to virtually any type of mobile or home hardware device running a web browser.

Instead of the device – let's say a mobile phone – having to work damn hard to render and display decent 3D or HD graphics (or be unable to by virtue of hardware limitations) the AMD Fusion Render Cloud will do all the hard work on its own central cluster, store the content in a compute cloud, compress it and then stream it real-time over a wireless connection.

Without all the marketing malarkey about



and to then to make them available to a broader audience through new distribution methods will bring about a renaissance in content creation and consumption," said Robert Rodriguez, Director at Troublemaker Studios and advocate of AMD's new multimedia beast. "Imagine watching a movie half-way through on your cell phone while on the bus ride home, then, upon entering your home or apartment, switch over to your HD TV and continue watching the same movie from exactly where you left off, seamlessly, and at full screen resolution," added Boswell.

The concept may unfortunately fall prey to the same pitfalls that all thin-client solutions face, chief of which is bandwidth and I/O shortfalls. While the supercomputer may be capable of rendering, compressing and routing gobs of photorealistic data at an unprecedented rate, the device at the other end still relies on the WAN or VPN pipeline in-between to ensure smooth, seamless delivery. It remains to be seen if there's any viable way to get the content from one end to the other in a format that doesn't resemble an awfully pretty slideshow. Nevertheless, AMD is pushing ahead with the concept and expects to have the machine up and running half way through the year.

Here's just a taste of the stories we've posted up on the Atomic website this last month:

#### Got batteries? Get Supercapacitors!

Info on how to build a better battery, from Vito Cassissi.

<http://www.atomicmpc.com.au/?134487>

#### Thermaltake Spedo Gallery

Following on from the review in last issue, we took some more shots of this case, ready for your viewing pleasure!

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#### Think you can write a better review?

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(Which, we guess, would make it good for working out who's been SMSing pictures of bottoms to your mates from your phone.)

(Which, really, can happen to anyone, mum.)



## 2. Internet for Dummies, 4th edition

Price \$39.95 Website [www.johnwiley.com.au](http://www.johnwiley.com.au)

We're pretty sure that if you're reading this mag, you probably don't need this book. You've probably been online for the better part of a decade or so, and can no longer even imagine what it was like back in those pre-internet days of yore (when dinosaurs roamed the Earth). However, given that you are bit of a veteran, we bet you're also plagued by well-meaning friends and relatives who still have no idea what URL stands for, don't understand the basics of HTML, or can't quite figure out why typing in ALL CAPS is getting them banned from their favourite new dog-owners' forum.

Well, worry no more – give them the latest edition of Internet for Dummies, and you can say goodbye to your unofficial tech support role!

## 3. Memorex clock radio mi4019

Price \$69.95 Website [www.memorex.com.au](http://www.memorex.com.au)

Okay, let's work up a checklist for the ideal modern clock radio (because, frankly, there are only so many variations we can come up with for 'hundred-odd word spiel about a product').

1. Small enough to sit on bedside table or milk-crates. Check.
2. Range of colours to match decor (see milk-crates, above). Check.
3. Tells time. Check.
4. Accurately. Double-check.
5. Easy to find when hungover Snooze Button. Check.
6. Dock for your iPod (hipster!) or other MP3 player (slacker!). Check.

Looks like we're on a winner, here, folks!

## 4. Olympus Mju 9000

Price \$TBC Website [www.olympus.com.au](http://www.olympus.com.au)

It wasn't all that long ago that if you wanted a digital camera that packed an (apparently) massive 12 mega-pixel CCD, you'd need to sell a kidney, a child and option naming rights for the rest of your possible spawn to a major Wall Street-listed company.

But these days all you have to do is pick up the super-stylish yet oddly-named Mju 9000.

Not only do you get the big (apparent) pixel count, you get a 10x optical zoom, shake-proof CCD image stabiliser (that would be fun to test), and it's all packed into what may be the slimmest and smallest camera body on the market.

Outside of spy movies, anyway.

## 5. Starcraft & Warcraft manga

Price \$15.95 Website [www.madman.com.au](http://www.madman.com.au)

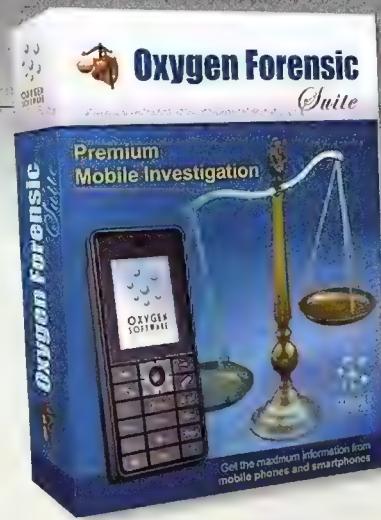
There's one day of the week that Warcraft fans hate more than any other: the dreaded... PATCH DAY. But fear no more, Gnome-fans, we've got the solution!

Two new Warcraft manga collections have just been released by Madman Entertainment, and they make the perfect way to get through those agonising WoW download times.

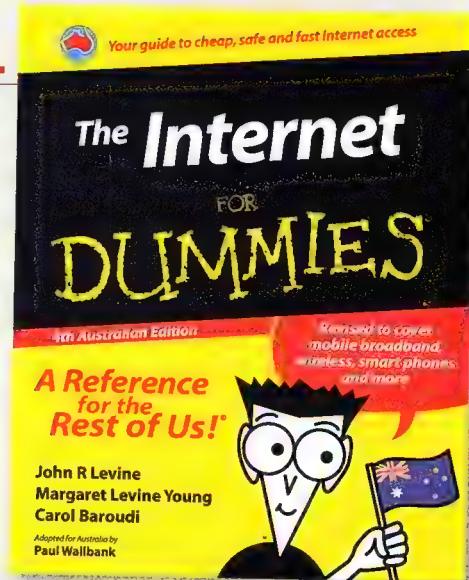
The Sunwell trilogy follows the ever-so-dreamy story of Kael, a blue dragon in human form who seeks to investigate a mysterious power (tm), and Warcraft: Legends is a collection of stories written by best-selling novelist Richard A. Knaak and drawn by Jae-Hwan Kim.

Oh, and if you're a Starcraft fan and you're looking for something to tide you over until Starcraft 2 (like the rest of humanity), the volume 1 of Starcraft: Frontline might be just the thing to see you through the sweats.

1.



2.

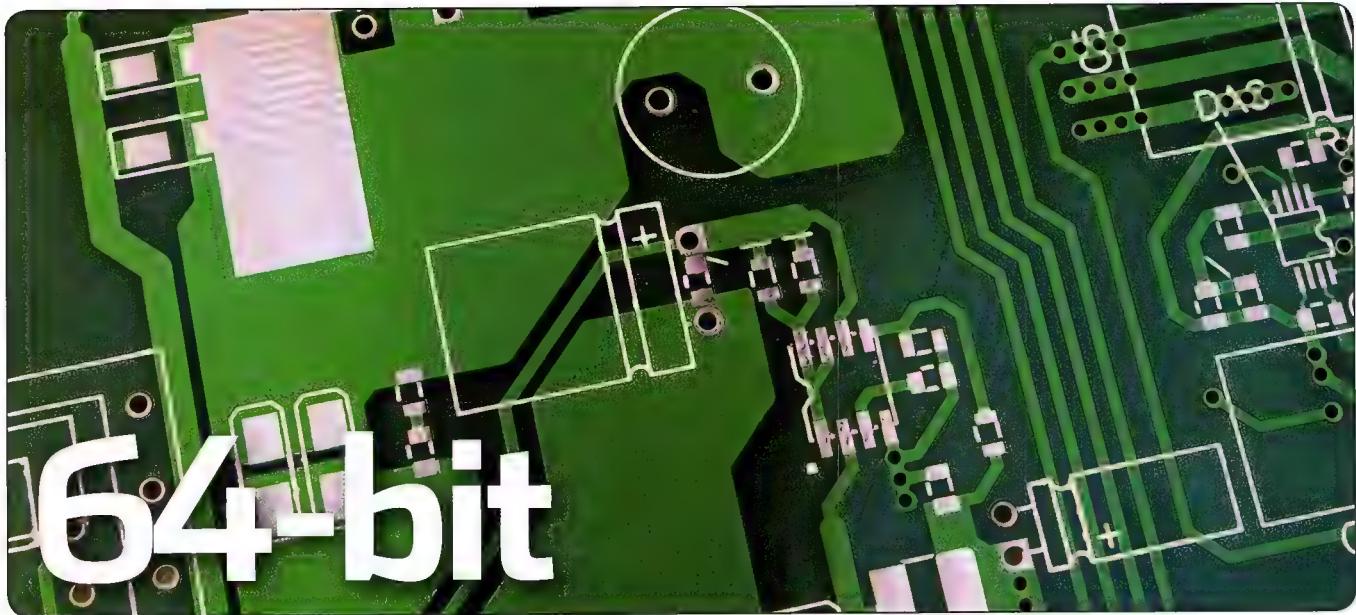




3.



5.



The 32-bit era is coming to end, but what does this mean and what's so great about 64-bit? **Ashton Mills** pads the bits.

The advent of 64-bit CPUs brought with it the promise of a new level of computing. The inevitable successor to 32-bit just as 32-bit succeeded 16-bit before it, we naturally assume it must better. But how is it better, and how does it affect you?

## The case for bits

I've said this in numerous X-Ray pieces, and it applies again here: the technology isn't new. 64-bit computing has been around since the 1960s when IBM developed its Stretch supercomputer, able to process data and instructions with 64-bits. But it wasn't really necessary back then, and even in more recent years 64-bit computing has been the domain of servers and supercomputers with real work to do rather than the pithy Windows thing desktops run.

Inevitably technology trickles down, but ironically the first consumer level devices to

## Where'd my RAM go?

If 32-bit CPUs can see up to 4GB of memory, how come 32-bit Windows machines only see around 3.2GB? The distinction lies in the terminology – a 32-bit CPU can address up to 4GB of space, but this isn't the same as 4GB of memory on a system: within that address space must come mappings for all the devices in a PC, including video cards which can have 512MB of onboard memory or more. This is why 1GB VRAM systems lose a lot of more of the addressable space than single card 512MB systems. The only solution is to use a 64-bit CPU and operating system which can easily fit all the 4GB of main memory and all the devices well within its 16 exabyte limit!

receive the 64-bit treatment were gaming consoles – the Nintendo 64 and Playstation 2. It didn't reach mainstream computing until AMD released its AMD64 line of CPUs, starting with the Opteron line, which ultimately spurred affordable desktop oriented 64-bit CPUs from AMD and Intel soon after.

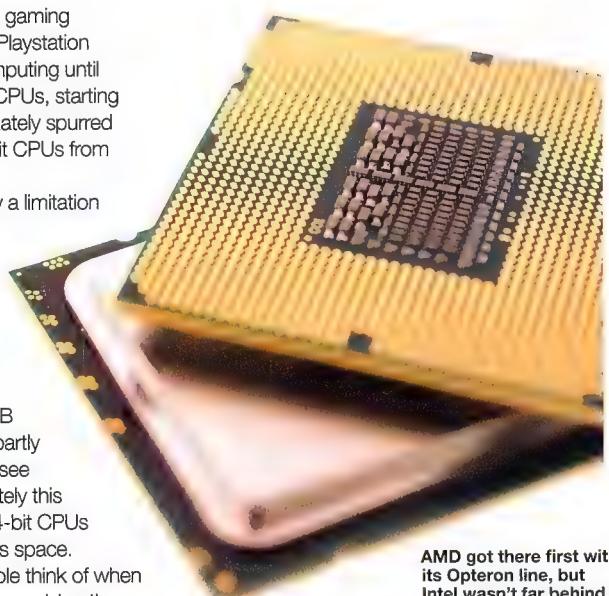
The timing was partly driven by a limitation of the 32-bit architecture: 32-bit CPUs can only count so high. As memory became more affordable, and mainstream processors formed the basis for servers, the demand for memory rose and the humble 32-bit processor can only see up to 4GB in addressable space. This was partly satiated through the use of PAE (see 'Easy as PAE' sidebar) but ultimately this was a stop-gap on the way to 64-bit CPUs and a much, much larger address space.

Indeed, this is what most people think of when they hear about 64-bit computing – raising the limit from 4GB to a mind numbingly large 16EB, or exabytes. That's over 16 billion gigabytes.

But 64-bit computing is about much more than addressable memory, it's an architecture change that requires software to change as well, and this brings its own advantages and disadvantages.

## What's in a word?

This is actually a very good question when it comes to computing – your CPU thinks in chunks of data known as a *word*, which roughly approximates to the largest block of data it can process at one time. Traditionally a word is 16-bits, born from previous architectures and carried over as technology progressed. A



AMD got there first with its Opteron line, but Intel wasn't far behind.

double word, or *dword*, is 32-bits and this is the fundamental word size for a 32-bit processor. Data, instructions, registers, pointers and addresses are all managed in 32-bit dword sized blocks. Internally the processor can't cope with anything larger unless it splits them up into 32-bit sized chunks, which takes more time.

And that's where 64-bit CPUs have an advantage. As the name implies, a 64-bit CPU can use a word size 64-bits wide, otherwise known as a quad-word or *qword*. Data, instructions, registers, pointers and addresses can all be 64-bits in size, manipulating or performing instructions on more information at a time. Indeed, one of the key features of a 64-bit

CPU is its ability to sometimes process in one clock cycle what would take a 32-bit CPU two.

Which, on the surface, would seem to imply that a 64-bit CPU is twice as fast as a 32-bit one, but a doubling of the word size is not equivalent to a faster processor. In fact in some cases, it can even be slower.

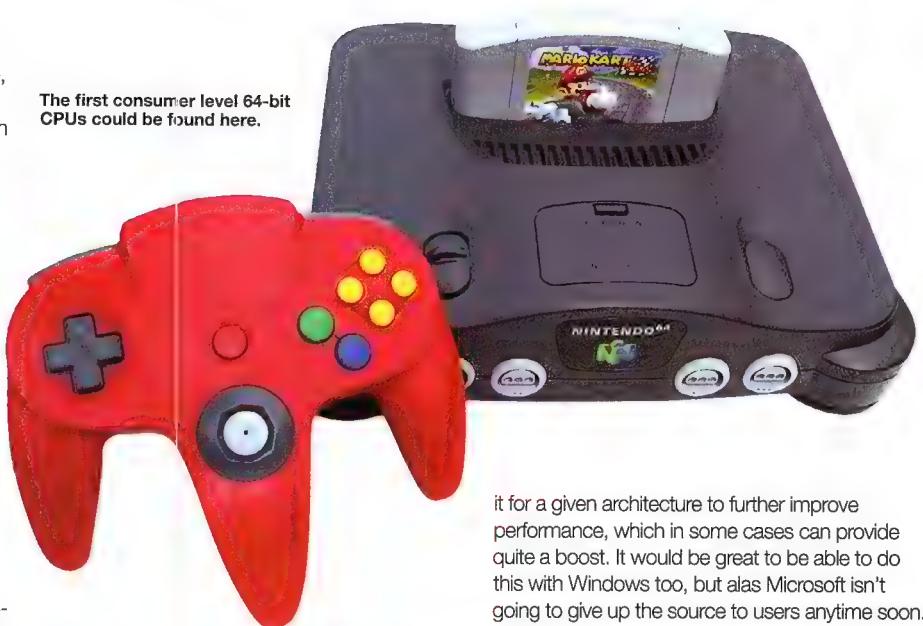
It all comes down to the data and what the CPU needs to do with it. Software that performs complex maths – especially compression, encryption, and encoding – can usually leverage the larger word sizes to process more data at once. And here, most certainly, there can be considerable performance gains. Multimedia instructions (think SSE et al) can also perform faster, as these usually operate on 128-bit data and, again, a 64-bit CPU can process these faster.

However for most tasks you do, at least on a desktop computer, the extra word size has little if any impact at all. Browsing the web or tapping away in Word isn't going to require the use of large word sizes. Which is why when you installed 64-bit Windows or Linux on your first 64-bit CPU everything seemed just about the same, because it was.

There is an exception, and it's more a indirect benefit than a function of 64-bit architecture – Windows and most Linux distributions are compiled for the lowest common denominator to ensure they can run on as many platforms as possible. This means not tailoring the binaries for particular CPUs, but using a generic base i386 instruction set. This usually means some of the advanced CPU features developed over the years for accelerating performance can't be taken advantage of, as different CPUs support different functions.

The same is also true for 64-bit versions of Windows and Linux, with the exception that even

The first consumer level 64-bit CPUs could be found here.



it for a given architecture to further improve performance, which in some cases can provide quite a boost. It would be great to be able to do this with Windows too, but alas Microsoft isn't going to give up the source to users anytime soon.

## When bigger isn't better

So for the most part going 64-bit won't make much of a difference unless you're doing graphics and video work, encoding or encrypting, or doing a lot of compression. However in some cases, especially on older 64-bit CPUs, running a 64-bit operating system can actually impact performance.

## Easy as PAE

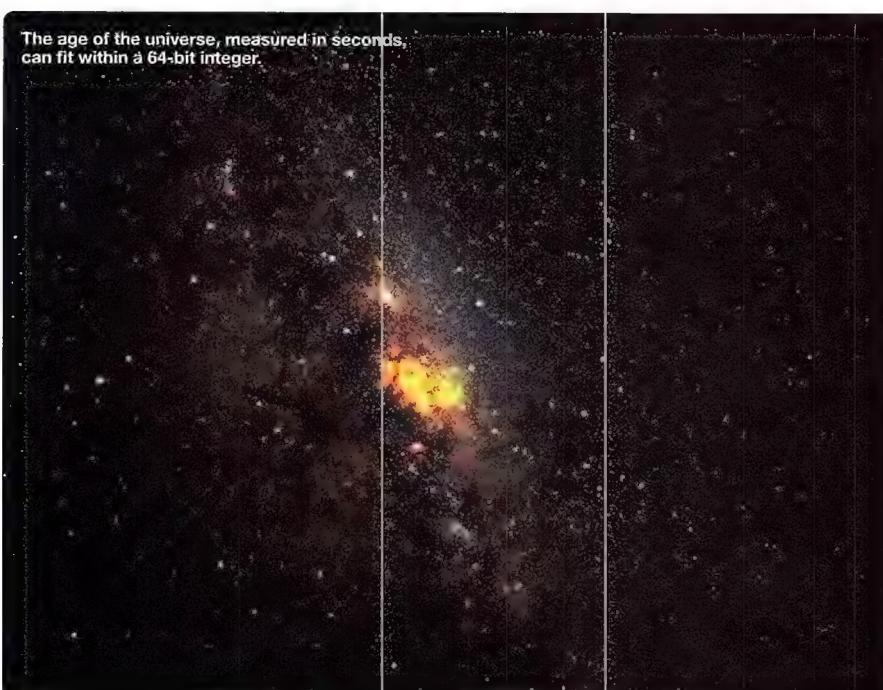
While theoretically a 32-bit CPU can only see up to 4GB of memory – because it can only count to 4GB with a 32-bit value – that doesn't necessarily mean that's the maximum memory it can use.

Before 64-bit became more mainstream, any decent CPU since the Pentium Pro came with the PAE (Physical Address Extension) feature. PAE effectively maps 36-bits worth of memory to the 32-bit address space and, in the process, extending the maximum addressable range up to 64GB.

It does this through some clever remapping and translation techniques, which come at a cost of a small overhead. Additionally, operating systems and applications need to be PAE-aware to take advantage of the extra memory. Because most applications aren't, the most common way to use PAE is for the operating system to be programmed to use the space above 4GB while applications used memory below – for example, as a large cache for server or database systems.

Today 64-bit CPUs are very affordable and there's not much call for PAE anymore. However, it certainly will have served its place over the years for large systems that required plenty of memory when the 32-bit CPU could only see so much.

The age of the universe, measured in seconds, can fit within a 64-bit integer.



As structures on a 64-bit system are 64-bits wide, they take up more memory. Data, addresses, pointers and the rest are all larger and so code size can be, and often is, bigger as well. One reason for this is that 64-bit compilers align data on 64-bit boundaries, and structures that are less than 64-bits (such as a 32-bit integer) are 'padded' when they are aligned. A 64-bit version of a program is often larger than the 32-bit version of the same.

This may not mean much on disk in this age of 1TB drives, but when that code goes into memory on your average 2GB machine, it starts to add up. By way of a quick test you can grab a Linux distribution LiveCD in both 32-bit and 64-bit varieties and load them up on a PC then check their memory usage. Using the latest Ubuntu 8.10 LiveCD for example, after letting the boot settle for two minutes the memory usage on the 64-bit version is 129M more than the 32-bit one, for the exact same software, and before loading any applications. It's a small but not insignificant hit for a 2GB machine, and more than one tenth of the available memory

## ... larger code means less efficient use of a CPU's L1 and L2 caches, causing more cache misses and slowing processing down.

on a 1GB machine. Additionally, larger code means less efficient use of a CPU's L1 and L2 caches, causing more cache misses and slowing processing down.

For this reason older CPUs, and especially 1GB systems, are better off sticking with a 32-bit operating system, even if the CPU is 64-bit capable.

Finally, although it's less of an issue now, the transition to 64-bit software takes time and while there are 64-bit versions of just about everything under Linux (because the same source can be easily re-compiled for 64-bit systems) the same

## Blow your mind

The limitations of 32-bit hardware spill over into the software world, and while there are many examples, perhaps the best is the Unix Millennium Bug, aka the year 2038 problem.

Since the earliest versions of Unix, time has been stored as a signed 32-bit integer, with January 1 1970 as the epoch. Back then this probably seemed like a really long way away. But come 2038 time calculations based on Unix time will 'wrap' over and reset, causing what amounts to the hype around the Millennium bug (which ironically Unix systems didn't suffer). Because it's an integer number, we actually know precisely when this will occur: Tue Jan 19, 03:14:07, 2038.

The solution is to migrate to 64-bit systems, which of course is already happening now with both commercial and free server and desktop Linux distributions providing 64-bit versions. It's reasonable to expect, especially with the pace of

technology, that 64-bit will most certainly be the standard in 20 years time and that all critical systems will be replaced by then – although some legacy applications may need to be updated as well.

As an aside, one milestone will have occurred around the time you read this: on Feb 13 2009 at 23:31:30, Unix time will be 1234567890 seconds.

What's so mind blowing about all this? Well, you know that 64-bit address space theoretically allows a machine to see up to 16 exabytes of memory, so with time stored in a 64-bit integer, how many extra years will that give us until another rollover happens?

Oh, I think by then we'd have solved the problem of time, and probably even time travel – for a 64-bit integer buys us another 292271023017 years. That's just over 292 billion years, approximately twenty times the age of the universe so far.

I wonder if Atomic will still be around then...

today with multimedia extensions using 128-bits, key sizes for cryptography often being 128-bits long, and IPv6 addresses stored in 128-bits too. Manipulation of these data structures would be faster on a 128-bit CPU.

That said, they would of course increase the address space as well – to sizes so large they are hard to comprehend: 128-bit processors would allow for 274,877,906,944 yottabytes of memory (That's 302,231,454,903,657,293,676,544 terabytes. Yes, that's a lot of pr0n.)

The reign of the 16-bit machines lasted around nine years, and 32-bit around 18 years. Conceivably, we might expect 64-bit to last us another 36 odd years at least. And that sounds like a lot, and then you remember how fast technology moves in the realm of computing, for which 36 years is all but an eon. We can barely predict how the landscape will look five years from now, so we'll just put it on the books that 128-bit CPUs will be out there in time, but when is anybody's guess. ☺

## What about Games?

While it could depend on the game, generally speaking games don't really take advantage of larger word sizes in their processing. Not many games provide 64-bit binaries so it's hard to compare, but a simple test on an 4.5GHz E8600 with SLI GTX280s in Vista x64 using Crysis' own benchmarking tests at 1920 x 1200 showed just a (albeit consistent) 1 fps increase in the CPU1 and CPU2 tests between the 64-bit and 32-bit binaries, and a mere half a frame per second increase in the GPU test.

That's not to say this won't change in future, but it aligns with the type of workloads which would see an improvement on 64-bit, and games don't often come under this.



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# INPUTOUTPUT

Dan Rutter brings the answers to your questions like no-one else can.

## I/O OF THE MONTH

### Enclosure d'Elegance

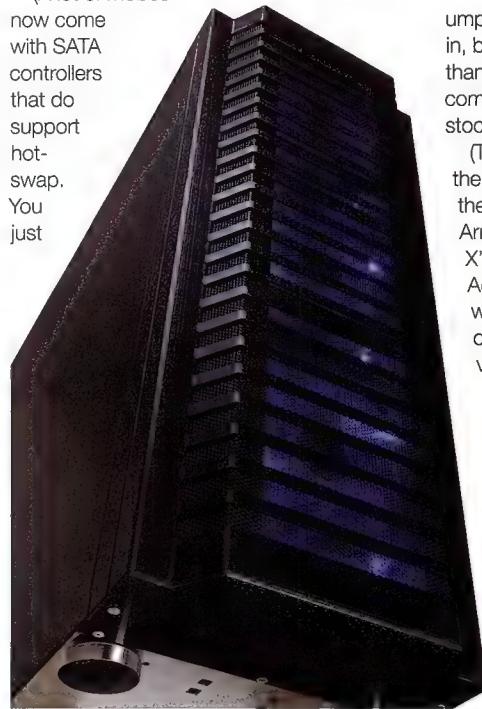
**I** I'm about to take the plunge and buy a Lian Li PC-P80 case (I know it's excessive, but I feel the need). I don't intend to do overclocking or water cooling. Someone suggested that I might be better off buying a server case for this amount of money ("how about a proper server case where the HDDs are hot-swappable and in a separate chamber from the m/b?"). I find the idea of hot-swap drives appealing, but from what I've seen so far those cases are very expensive.

Do you agree that a server case would be a better choice? Do you know of any server cases that are in the same price bracket and would be a better buy than the PC-80?

John Windsor

**O** If you get a case with hot-swappable drive bays, you'd better buy a motherboard or controller card that supports them, or you're going to get a nasty surprise when you pull one out.

(A lot of mobos now come with SATA controllers that do support hot-swap. You just



Compare...

have to avoid pulling drives that contain swap files, or your operating system.)

You can get perfectly good server cases with the same basic specs as the basic black Lian Li Armorsuit PC-P80 for less than the \$500 to \$550 that it costs. They won't be all aluminium and smooth and nice, though; you really do get something extra for your money when you buy the P80.

Those server cases won't necessarily come with hot-swap drive bays, either. The usual server version of these is a caddy arrangement where you need one caddy per drive you want to swap. SATA drives make it easier, since the standard SATA connectors are physically well-suited to easy plugging and unplugging without any extra hardware, and you can get 5.25in bay and outboard USB doodads that let you use bare SATA drives like giant floppy disks. This sort of setup is not robust, though; if you don't take proper anti-static precautions, you can lose a terabyte of data in a hundredth of a second.

There are all sorts of server cases with umpteen SATA and/or SCSI caddies built in, but they can cost quite a bit more than the PC-P80, and normal computer stores don't stock them.

(There are more options at the \$800-odd price point of the PC-P80R, the bright red Armorsuit with 'ATI Cross Fire X' cut into the side panel. Advertising ATI on your case will cost you another \$300 over the price of the black version.)

If you're actually going to be swapping hard drives regularly then one or another hot-swap solution is a great idea, but as I mention in [www.dansdata.com/askdan00029.htm](http://www.dansdata.com/askdan00029.htm), it's now very easy to add a swappable bay or three to any normal case. All of the other stuff in server cases – dozens of drive bays, space for more than one motherboard, dual redundant PSUs – is irrelevant to desktop PCs



**I/O OTM**  
WINS A LOGITECH G5!

There's a mouse in the house. Okay, it's not in the house, it's in I/O. And it looks damn good.



(and many servers, actually). All that stuff just gives you a computer that'll herniate you if you have to lift it, and that'll probably consume more power too (for extra fans, and for dual PSUs if one of them's just ticking over waiting for the first one to die).

There's a lot to be said for 19in rack server hardware if you want to install a bunch of stuff in your computer room – normal PCs, networking gear, music production gear – and keep it tidy.

Again, though, this is pointless for most users.



...and contrast.

## Solid-state fan!



Thought this might interest you:  
[tinyurl.com/ioncooler](http://tinyurl.com/ioncooler)

Russell Stapleton

**O** When that story first popped up and got mentioned on Slashdot and such, there was considerable criticism based on the bit at the end where the inventor just arbitrarily decided that his ionic blower moves 325 cubic feet per minute, yet makes no noise.

But the chap responsible should be congratulated for sticking with the idea and improving it. He made a version 2.0, [tinyurl.com/ioncooler2](http://tinyurl.com/ioncooler2), and a CPU cooler, too: [tinyurl.com/ioncooler3](http://tinyurl.com/ioncooler3).

(Russell actually sent me this letter a million years ago, when only the first project had been completed. I've updated my email reply from back then to take the new projects into account.)

He tested at least the CPU cooler properly. It didn't work as well as the stock fan, but it did work well enough to be useful. Fair enough. Hats off to the guy for making a no-moving-parts air-shifter that really does, to some extent, work.

Ionic air movement clearly isn't a great solution for PC cooling, or for many other applications. A big part of the reason why 'Ionic Breeze'-type air filters, famously, don't bloody work, is that they don't move very much air at all. That's why they're so quiet; you can't move 325cfm through a computer case, or any other small housing, without making noise.

(There are plenty of electrostatic air cleaners that do actually work, by the way. Their electrostatic components are just there to trap dust; they have conventional fans to move air through them.)

A computer that's cooled by an electrostatic blower is still a neat contraption, but the blower's probably not going to give you a lot more air flow than you'd get from completely passive convective cooling in a suitably designed case (or if you just left the side off the enclosure...). I'd be nervous about using any such machine if the ambient temperature was high. I'd also be annoyed about how often I had to clean off the fans and grille inside – electrostatic precipitation will stick every incoming dust particle to the fins and grille.

Electrostatic air movement does have applications on very small scales, where you're trying to cool tiny integrated-circuit components and want to be able to fit the air-mover on the chip too.

In the macroscopic world, though, boring old fans work way better.

## Wall wart or black art?



I've had occasion to play around with several laptops, sometimes having to jury-rig or swap power adapters for them. I always wondered how they are spec'd. I would believe it would be the second of these two hypotheses, but I would like your opinion.

A: Their output power corresponds to the worst-case scenario power requirements for the components of the most powerful laptop in the series for which the adapter is built. So for example if the top-of-the-line ThinkPad 770 series with DVD and hard drive, running the screen at full brightness draws 60W the 770-series adapter would be, say, 65W. Because manufacturers prefer to ship many different models with a single adapter model, they usually have a large headroom.

B: The most draining component might actually be the battery as it recharges. Because battery voltages are by laws of physics always a multiple of a fixed number depending on their type (3.6 for lithium ion, I guess), there are actually few different adapter specs out there. The only difference is the amperage, which would govern the time it takes to charge the battery (something consumers rarely bother about), depending on the capacity.

I would tend to believe this second version, because laptops get hotter when charging and I know using an underpowered adapter usually results in a slow charging or barely charging battery.

Manufacturers and resellers worldwide like to issue dire warnings about using replacement adapters, and often play the 'fancy adapter

plug' game (in which Apple seems to be a winner). Am I wrong in saying that if B is right then it's typical marketing crap and that basically all laptops using a given battery voltage (which is to say a couple generations of models) could share a common adapter?

Florian Ferrand



Yes, power adapters are spec'd to cover the highest-powered laptop in the line working as hard as it can, plus overhead to deal with battery charging and extras like all of the USB ports outputting their full 2.5 watts.

Battery charging power can be quite substantial, though. If it only takes a couple of hours to more or less fully charge a 75 watt-hour battery, then the charge power pretty much has to be up around 50 watts (not 37.5, because considerable power is lost in the charging process).

Manufacturers often change the power plug specifically to stop people accidentally plugging old power supplies into new laptops and overloading the PSU, but no, they don't always do it for that reason.

You can tell, because it's generally quite safe to use off-brand one-size-fits-several mains (or car) laptop power supplies, as long as they come with the right plug for your laptop and their ratings match (or for current, exceed) the ones on the stock power adapter's sticker. I'm sure there are some cheap Taiwanese mains or car adapters that blow up laptops, themselves, or both, but there certainly doesn't seem to be a plague of them.

That's mainly because modern laptop power adapters really are just giant wall warts. The bulk of the regulating and all of the charging hardware is built into the laptop, not the power supply. In the olden days computer power bricks commonly had multiple voltage output and sometimes even weirder stuff like clock signals, but modern laptop adapters are just simple high-current one-voltage DC devices.

Their only complexity comes from their switchmode circuitry (thank goodness, or they'd all weigh five kilos...), which was fairly black magic 20 years ago but is thoroughly understood by even the dodgiest Chinese manufacturers today.

## De-blinging



I really want to buy a Thermaltake A2309 iCage ([tinyurl.com/4V5QK9](http://tinyurl.com/4V5QK9)) for mounting 3.5in drives in 5.25in bays. However, the company bling-ified it with an LED fan.

Is there some way to disable the LED in the fan without destroying the fan or causing a fire hazard?

William Krick



The fan in the iCage looks like the kind that has LEDs wired up around the edge of the fan under some tape, judging by the pictures on the product page.

It's easy to snip the whole LED assembly off one of those fans, or at least cut the wires that feed them. Make sure the cut wires are insulated and not touching, and you're done.



Just snip and unwrap!



# Lost at sea

Another technology giant demonstrates how out of touch with the connected world it can be. And, at the same time, becomes another company to invoke the Streisand Effect.

You no doubt heard about the Seagate 7200.11 drive bricking fiasco, with some drives in the 7200.11 lineup with SD15 firmwares locking up and sitting tight, data still intact but inaccessible (check out [www.atomicmpc.com.au/?134998](http://www.atomicmpc.com.au/?134998) for all the juicy details).

In the end Seagate released a fixed firmware, and when the actual circumstances came to light under which the drives brick themselves, and the rarity of this occurrence, it turned out to not be as big an issue as everyone thought it would be.

## It's not really hard to comprehend that the internet changes how we do business...

Not helped, however, by Seagate's handling. The first mistake was withholding information. While reports of drives dying started piling up over the course of a month, Seagate protected its shareholders by saying nothing. The irony, of course, is that had the company been transparent about the issue the resultant backlash and exposure wouldn't have been half as bad as it was – lack of information inevitably creates noise, and the real scope of the problem no longer matters, only the *perceived* scope.

With its head-in-the-sand approach, legions of customers whose drives had died flooded the forums. When none came, the news broke on the main technology sites, and from there the noise intensified. Without any real details at all, people affected with dead drives mixed with those who thought theirs might die, and they piled into customer support, apparently bringing Seagate's support phone system to its knees.

Further, the company deleted posts and links from consumers posting on the forums relating to the issue, revealing just how far the company is out of touch with the internet – here's the memo

for you Seagate: what is removed, propagates. With censorship on Seagate's forums, users moved off-site, where users could share details without getting censored.

This was its second mistake. Instead of quieting the issue, the censorship exploded it. In trying to downplay the problems with the drives, the company only served to fuel worldwide attention. Whatever fallout it hoped to avoid, it actually invited upon itself thanks to the Streisand Effect. Such is the internet.

and that data could actually be recovered.

It's not really hard to comprehend that the internet changes how we do business, but some companies – even technology ones – still don't get it. Transparency is vital, even if you are at fault. Admitting a mistake and notifying that it's being worked on would have cut the noise down considerably and gone a long way to placating customers. It will come out anyway, so you might as well control the release of that information. And, as I covered last issue, in today's connected world when you sell a product you sell a relationship. This isn't optional, it happens whether you like it or not. Companies that understand this can leverage it, companies that don't will find it comes back to bite them – just as Seagate has learned, and Creative before it. 

Ashton Mills' firmware is fully up to date.  
[amills@atomicmpc.com.au](mailto:amills@atomicmpc.com.au)

Both of these mistakes sit firmly in the realm of information dissemination. Doing this properly would have saved Seagate a lot of trouble, but it also didn't help that its first 'fix' for the drives actually did the opposite, and bricked them instead. This naturally started a flood of threads from people who – eager to stave off any problems on their currently working drives – flashed the firmware only to find it killed them. Regardless of the reasons for the original problems – which probably were quite mild in the grand scheme of things – to release a fix without properly testing it is simply negligent. It's not as if it had a shortage of drives to test with!

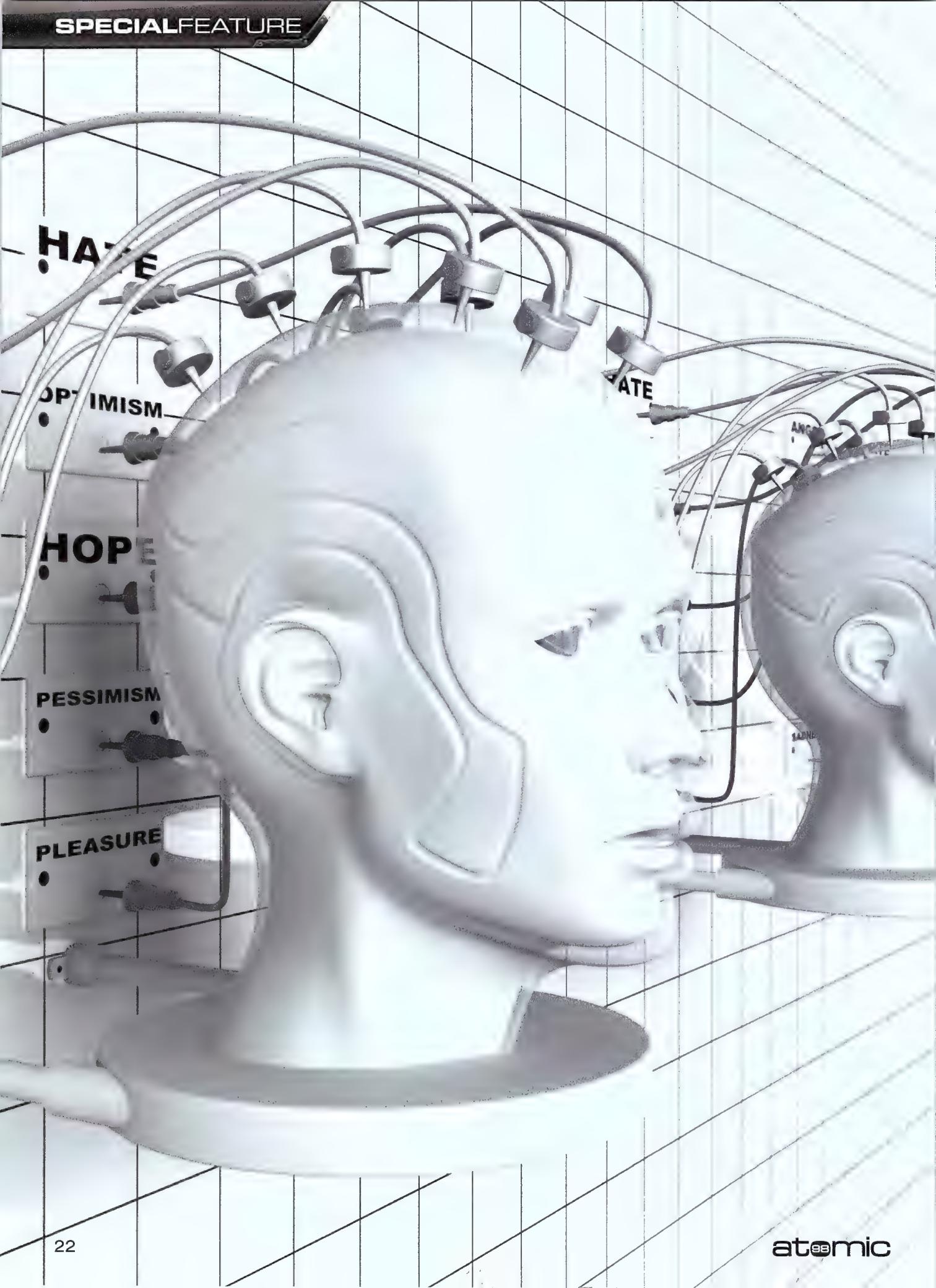
The most useful, and informative information came not from Seagate but a rogue employee posting on Slashdot claiming to be Seagate engineer. His knowledge of the drives seemed legitimate, and the detailing of the internal politics logical. Although a fix still relied on Seagate releasing a working firmware solution this engineer's posts did more to alleviate the problem than anything official. He explained the likely source of the problem, the chances of it occurring,



## Science fiction violence



Games for Windows® LIVE



# Rise of the Machines [PART 2]

**Christopher Taylor** delivers the second part of his look into artificial intelligence. This month, he discusses emus, Robin Williams and warmongering Quakers.

**D**uring the 1980s and '90s, artificial intelligence was a term on almost everybody's lips. Grim films like *The Terminator* instilled in the public consciousness a fear that not only was advanced artificial intelligence right around the corner, but that when it came it would be so powerful we would have no hope of controlling it. As time went by and no super smart killer robots emerged, the general public calmed down.

Then out came *Bicentennial Man* and *A.I.*. Movies that showed artificial in a more positive light.

These were machines with human desires and human needs. For about half the movie, all Robin Williams – amusing and endearing and wise and about everything else required of the various Hollywood character archetypes he progresses through – wants is a kiss. How sweet. He's a machine with emotions. A machine with a soul. And by the time the credits roll, he's literally human.

It's a phase western society tends to go through with technologies that, in the eyes of the general public, seem to creep up on us. Even

though artificial intelligence certainly didn't do that, as it'd been a topic of research since the 1950s. We went through the same phase with mobile phones. One year the public considered them carcinogenic, the next year they – unlike shotgun-wielding, motorcycle-riding terminators – were everywhere. In recent years we went through this with the internet. Statistics were kicking about the US media that said 50,000 paedophiles were online at any one time, waiting to hurt your kid. Of course those statistics are balls. Anyone with half a brain would realise that the moment they laid eyes on them.

Similarly, the idea that this 'new' fangled artificial intelligence was going to be the end of us some time in the near future was also crazy talk. Artificial intelligence is nowhere near that advanced even in 2009 and, while it has been responsible for some incredible feats over the years – navigating a vehicle across the breadth of the United States, for instance – it still poses a great many fundamental challenges that need to be overcome before a machine will behave in a manner that a regular person might regard as intelligent.

## The logic of emus

Allow us to revisit an idea we discussed in last month's instalment: the robot employed to take care of household duties such as washing, drying and putting away dishes. This is an assignment that families typically give to their children, but it is one that would require an incredible amount of work on the part of artificial intelligence researchers – not to mention robotic engineers – to have a robot do with anywhere near the same degree of competence. Identifying the various types of cookware and tableware would require that its 'brain' employ pretty advanced pattern recognition. Pattern recognition is, of course, how we make sense of the world around us. It is how we determine what exactly an object, state, situation or event is and how we should respond to it. It is a core topic in the study of both natural intelligence and artificial intelligence.

The situation where a robot has to be able to distinguish between a teacup, a beer mug, a glass tumbler and a measuring cup so it can wash and then store them appropriately is an example of what artificial intelligence

researcher John McCarthy considered to be 'the qualification problem'.

Consider, for a moment, the following word: bird. If you're like most people, 'bird' probably conjures up an image of a small, flying, chirping critter. And yet pelicans aren't small. And seagulls don't chirp. Similarly, emus are large and flightless. That these species don't conform to the 'rules' that define the 'bird' category of objects doesn't matter. An ostrich might be incapable of flight, but it's no less a bird than a sparrow, a species that conforms to all three 'rules' by being small and issuing chirps and being capable of flight.

If the three 'rules' were phrased as a statement of standard logic, you'd end up with something like this: all birds are small, can fly and make chirping sounds.

How about another example? This time we'll use one from John McCarthy. You're on one side of a river. You need to get to the other side. There's a rowboat moored nearby. A statement of standard logic dictates that rowboats can be used to cross rivers.

See the problem? With the statement about birds, we know full well there are birds that

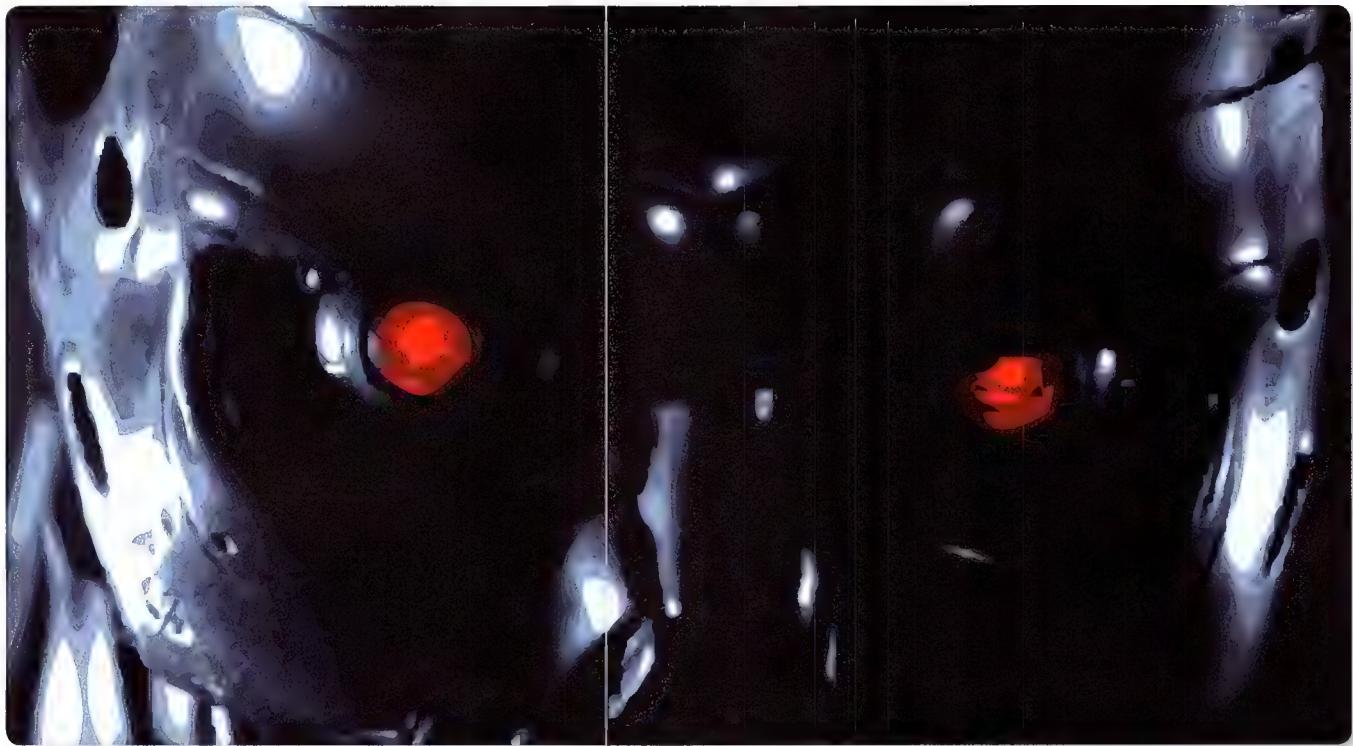
don't fit the rules, yet are birds nonetheless. According to the standard logic 'all birds are small, can fly and make chirping sounds', though, an ostrich is not a bird. Certainly you could change the statement to read 'all birds are small, can fly and make chirping sounds, except for emus, ostriches, pelicans and seagulls', but you'd run into problems again when you encountered a cassowary. Or, rather, you wouldn't. You simply wouldn't see it as a bird. Unless each and every possible exception is included, there will always be birds you won't categorise as birds because they fail to fit one or more of the rules.

What if the rowboat that was mentioned earlier had a damaged hull? What if the oars were missing? What if the oars were present, but were of a size incompatible with the rowlocks? These three factors make the rowboat unsuitable for crossing rivers. Our brain could recognise the rowboat as being useless the moment we saw that it was leaking, but to give a machine that same ability to reason would take a lot of work.

Sure, it wouldn't take much to tell a machine "rowboats can be used for crossing rivers, except when the hull is damaged or the oars are gone or the rowlocks are too small for the oars", but what happens in the unlikely event there's a grizzly bear napping in the boat? You would back away. The presence of the bear rules out the rowboat as a way of crossing rivers. And yet if you let yourself follow standard logic – unless it'd specifically been told that, yeah, the presence of a bear meant an exception to the rule – you would happily climb in and start rowing. A leak or a missing oar is a problem because standard logic specifically says so. A bear isn't a problem. A bear, with its teeth and claws and terrifying hugeness, isn't anything.

Both the Turing test and John McCarthy's 'commonsense' test said, in simple terms, that a machine is only intelligent if it behaves in a way an ordinary person would consider





intelligent. Climbing into a rowboat that's presently inhabited by a dangerous animal isn't an example of intelligent behaviour. A machine that does anything of the sort, even if millions of man hours went into feeding possible exceptions to the rule 'rowboats can be used to cross rivers' into its 'brain', would rightly not be seen as intelligent.

A.L.I.C.E. and Kismet, two chatterbots we spoke about last month, aren't intelligent. Certainly both are incredible feats of programming, but neither of them can hold a conversation about one topic for an extended period of time. After a few lines, they're likely to digress on some strange tangent.

The 'qualification' problem is that our categories for objects, states, situations and events – not to mention the countless exceptions to 'rules' you could be forgiven for assuming are important – are so incredibly complex. Consider the example of Richard Nixon. Now, this isn't us being political. This is a classic example of how what seems okay to a human – that Richard Nixon, adherent to a faith that advocates pacifism, is anything but a pacifist – would be a bitch to program.

As a rule, a Republican is not a pacifist. On the other hand, a Quaker is a pacifist. Richard Nixon is a Republican and a Quaker. Leave your logic like that, though, and if you first categorise Richard Nixon as a Republican you can't later categorise him as a Quaker. It simply won't work. Republicans not pacifists. Richard Nixon is not a pacifist. For this reason Richard Nixon fits into the category 'Republicans'. Richard Nixon cannot possibly be a Quaker. Quakers are pacifist. Richard Nixon is a pacifist, therefore all the other rules of Quakerism that he may

well adhere to strictly are irrelevant. It's the bird situation all over again. A seagull is small and capable of flight, but it doesn't chirp. Therefore, it's not a bird.

As stated over and over again last month, we don't fully understand natural intelligence. And that's a problem, as it's impossible to replicate something when we don't understand it. It's not the intent of every or even most artificial intelligent researchers to make machines that behave in a way that's recognisably human, but it is absolutely essential that researchers not only grasp this basic reasoning we engage in unconsciously, but figure out how to express it in a logical way. An infinite list of 'if, then, else, unless' statements clearly isn't the way to go.

## Lessons

Go back to the bear-in-the-rowboat for a moment. Imagine a man from the Namibian bush being faced with these situations. He's never encountered a bear before. He's never

big. A lion has sharp claws and teeth. A lion is built. A lion is a predator. It seems like this strange beast that's sleeping in the rowboat is also a predator. Predators are dangerous. It's time to make oneself scarce – quietly, of course, as predators have keen senses. This is pattern recognition in action.

Now, not all predators are big or sharp of hearing, but that doesn't matter. Clearly, qualities of the bear are such that it still falls into the predator category. But how do you get a machine to think in the same way?

You could tell it that not all properties of a given stimulus need be present for it to fall into a particular category, but where you draw the line? Take the three rules of birds – they fly, they chirp and they're small. Perhaps an object only has to get two out of three to qualify. But think about that for a moment. What if you see a dragonfly? It's small. It flies. Therefore, it's a bird. Some birds only conform to one of these rules. Some don't conform to even one. Too, to

## He's never even seen a photograph of a bear before. You can bet your arse he won't get in the boat though!

even seen a photograph of a bear before. You can bet your arse he won't get in the boat though!

To him, like most anyone else, what'd stand out about the bear was its size, its claws, its teeth and its muscular limbs. Now, as we said, he's never encountered a bear before, but he has seen a few lions in his time. A lion is pretty

our mind rules can vary in importance. When faced with a sleeping bear, surely the claws and teeth that remind us of the claws and teeth of a lion – a creature we know from experience to be a dangerous predator – are more significant than the features that are dissimilar in the split second it'd take us to recognise the bear as being something we'd prefer to part ways with.



Learning is another topic that's central to artificial intelligence. After all, the ability to learn is a sign of intelligence. Say you have a machine that's capable of learning. You can supervise its learning by showing it images of lions, tigers, jaws, raptors and pumas and marking them as dangerous predators. You identify the specific traits that make these animals dangerous predators. The claws. The teeth. The muscular build. The forward-set eyes. After enough examples, it should be able to look at an image of a bear and tell you that it's a dangerous predator. Why? It has some of the traits of dangerous predators.

A machine capable of unsupervised learning wouldn't need the features that make a given animal dangerous to be specifically identified. After seeing several images of dangerous predators, it'd find the pattern. It'd recognise that many have sharp teeth, that many have a muscular build, that many are quite large. When presented with an image of a bear, it'd be able to determine that a bear is a dangerous predator because it fits in with the pattern. It is a goal of some researchers that a machine capable of unsupervised learning wouldn't even need to be shown images of dangerous predators by a person, that it could seek them out for itself online in the same way a human would head to the internet or the library to learn more about a topic they were unfamiliar with.

Fitting in between these two types of learning you also have what is called semi-supervised learning. An example would be if you highlighted the features of the raptor and the tiger, then fed it the rest of the imagery without any highlighting. Essentially, you're telling it what to look for, but not to the same extent as you are with supervised learning.

Reinforcement learning is something we see every day. Consider a small child working on a school project. If he answers all questions correctly, he'll get an A, the teacher's praise and a sticker. The culture of the school tells him these are desirable things. He's covered this material in class during the preceding weeks and now that he's being tested on it, he'll be rewarded if he gives the right answers. The same way a dog trainer will give a dog a treat if it behaves as he commands it to. The wrong answers will be met with an F. Poor behaviour will be met with the teacher's disapproval. In days gone by, it would've been met with a cane on the bum. The teacher's lessons that provided the basis for the project and the child's knowledge of what's acceptable behaviour are reinforced through this system of rewards and punishment.

Inductive transfer is something else we humans are capable of that machines should also be capable of. Put simply, inductive transfer is when we take lessons on one topic and use them to help understand another topic. If you teach a robot that's capable of this to walk and then challenge it to run, it'll go over the walking lessons. Walking and running have things in common. Therefore, the lessons on walking are

problem is, of course, knowledge. Studying stimulus and seeing what happens when stimulus are dealt with in a certain way adds to one's knowledge. The more a machine knows, the more likely it is to respond to situations intelligently. If a machine knows that predators are dangerous and uses pattern recognition to determine that the bear sleeping in the rowboat is a predator and therefore dangerous, it won't get into the boat. Of course, that's some pretty broad knowledge for a machine that's there to simply row a boat across a river. Really, how likely is it that you'd ever find a bear asleep in a rowboat? Should the people who program such a machine spend millions of man hours teaching the machine every possible thing, no matter how unlikely, that could make a rowboat unsuitable for crossing rivers, even if using a rowboat to cross rivers is the machine's job?

Within the memory of a young human is stored an unfathomable number of very basic facts. Some, like 'predators are dangerous', are pretty much hard-wired, while we pick up countless others as we mature – from experiences we've had and experiences we've heard about by interacting with other people, watching television, reading books, listening to the radio or browsing the internet. These very basic facts are what allow us to respond intelligently, even in unfamiliar surroundings. They're our point of reference when we encounter new objects, situations, states and events in our environment. These facts are so basic that we don't consciously consider them even when faced with an exceptional scenario like a bear sleeping in a rowboat we were intending to use to cross a river. They're the things everyone knows. They're 'commonsense'.

A truly intelligent machine would need to

## Within the memory of a young human is stored an unfathomable number of very basic facts.

worth remembering when figuring out how to run. And then you have transduction, which is the complete opposite. It's simpler, too.

Lessons on walking apply only to the act of walking. When challenged to run, the robot will require dedicated running lessons. Which is preferable, inductive transfer or transduction, is a subject of debate. In the 1990s, researcher Vladimir Vapnik argued that specialisation is better. Lessons given to a machine should apply to a specific problem, rather than a more general problem. That is to say, a robot should be taught to walk so it can learn to walk, not so it can learn the principles of mobility that walking, running, jumping, hopping and skipping have in common. The robot can also be taught to run, jump, hop or skip if need be.

Central to both the topic of machine learning and John McCarthy's theory of the qualification

know this stuff. Even a chatterbot that exists only on a hard drive somewhere requires this considerable 'commonsense' knowledge. A.L.I.C.E. and Kismet's complete lack of commonsense becomes immediately apparent when you get past the greeting stage. They don't know anything. They might pick up tone from their visitors – some chatterbots are quite hostile when asked 'too many' questions, a pattern of behaviour they've picked up from their conversation partners – but picking up all of the knowledge we assume everyone has is much harder. Given the sheer volume of commonsense facts floating around human society, it would be impossible to give a machine anywhere near the level of commonsense a human being has. Expert systems do exist, yes, but they focus on specific areas. Medicine, for instance. And in

a specific area it is feasible for a machine to acquire more knowledge than any one human, but human knowledge is seemingly tailored more towards being broad than being specific – a necessity of living in such a complex environment. Knowing how to respond to a patient's medical maladies by analysing their X-Ray and recognising certain traits that the patient has in common with several other patients the system has encountered in the past is obviously very useful, but it's a very different thing to possessing commonsense.

No machine 'just knows' things in the way humans do. Much of the knowledge we use as a point of reference in our day-to-day lives isn't something that could be phrased into a coherent, logical sentence. Art experts sometimes just know that a painting is a forgery or is simply not by the artist it has been credited to. They can't quite put what's wrong with the painting into words, but they know with absolute certainty that something is amiss. How could a machine be programmed to spot fake works of art when the experts are often incapable of explaining exactly what about a given fake artwork suggests it is a fake. Recognising the patterns in highly detailed artworks is significantly more complex than being able to deduce that a bear is a dangerous animal because its physicality has a lot in common with a lot of dangerous animals.

Tied in to both the qualification problem and machine learning is, of course, planning. To be seen as intelligent, a problem-solving machine should be able to bring everything

together when faced with a problem. It should be able to qualify a problem. That is, it should be able to determine exactly what it is. It will look for a correlation between the current problem and problems it has either faced in the past or been taught how to deal with. For instance, if it's been taught to walk and is now being challenged to run, it'll consult its lessons on walking. This is assuming, that is, it is a machine capable of transference. It will also consult its memory for any past experience with running. Perhaps it's tried to run before. Perhaps it's seen people running. It will then set about planning. The ultimate goal, really, isn't to run but to get to a certain location. Before that goal can be attained, though, the machine must achieve, in order, dozens of sub-goals – lifting its feet, moving its arms to prevent loss of balance and so on. Consider again the automated domestic assistant we mentioned in last month's article and at the start of this month's article. The goal might be to have a clean kitchen. Before that goal can be attained, there are an incredible amount of sub-goals to work through. Dishes must be piled up. Dishes must be sorted. The sink has to be filled with water. Too, the machine has to have enough commonsense to know not to put the greasy casserole dish into the dishwater before the glassware and other dishes. And within all these sub-goals are more sub-goals. Filling the sink, for instance, is a collection of processes. First the sink needs to be cleaned of any dishes or debris, then the water needs to be run so it is hot. The plug needs to be put in – this may require a search. Detergent

needs to be added – this too may require a search – and then the water cut off. Each of these are specific goals that the machine needs to work through step by step. The water cannot be shut off before the plug is in the sink, for instance, or the sink will empty. If the sink is empty, the dishes cannot be washed. If the dishes are not washed, the dishes cannot be put away. And yet the machine must not get caught up in the details because the overall goal – having a clean kitchen – is all that matters to the machine's owners.

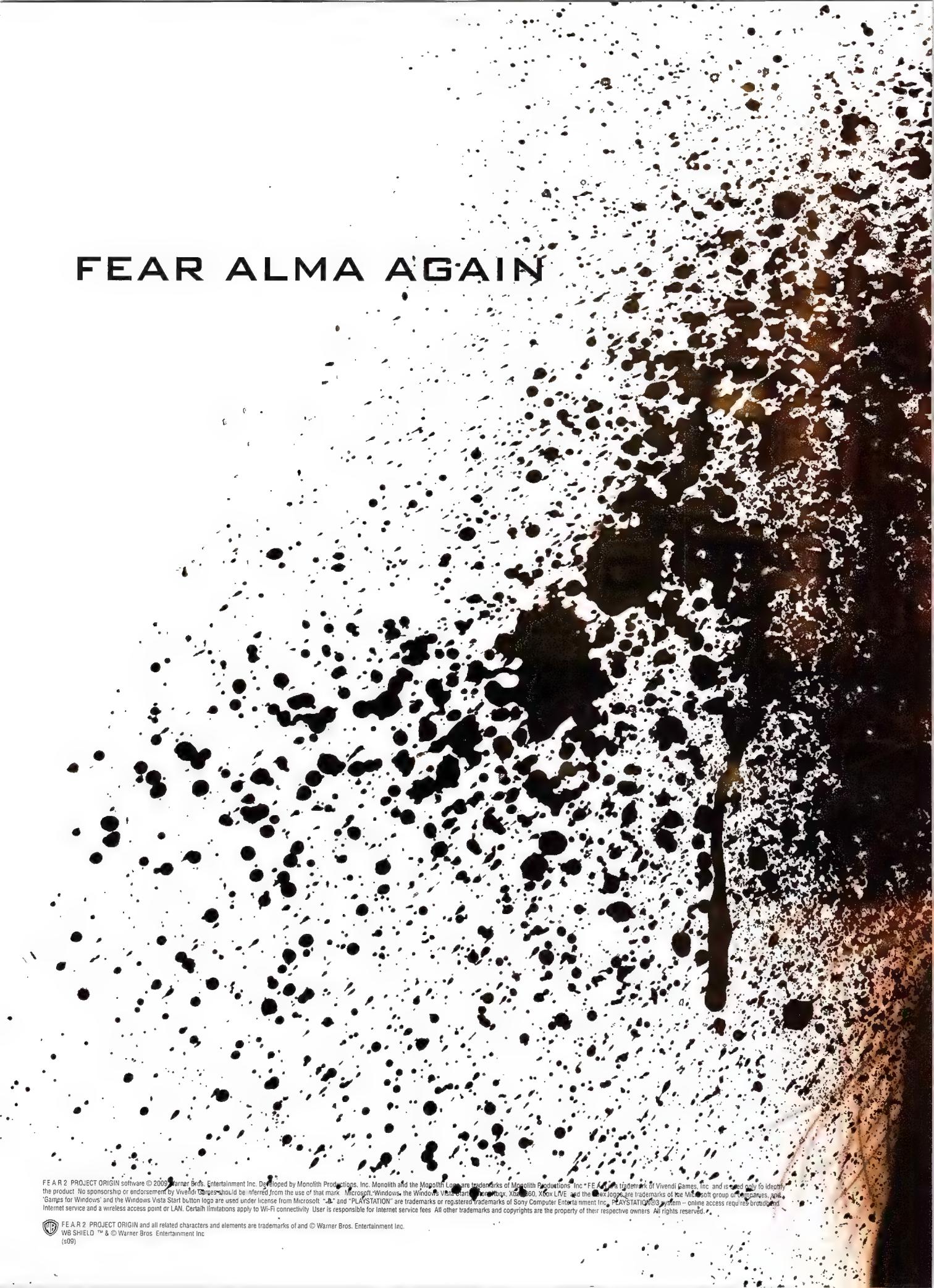
## Fin

From the outset, we knew that covering such a broad, complex topic as artificial intelligence in a total of 7000 words would be impossible to do without sacrificing depth and detail. It is for that reason we decided to focus on what we feel is the largest of the challenges – the development and use of reasoning capabilities – facing artificial intelligence researchers. The goal was not to write a technical report, but to explain the complexities of the thought processes researchers attempt to simulate or symbolise in artificial intelligence through a very relatable reference point – human intelligence. Not every researcher seeks to create a domestic robot that can crack Robin Williams jokes and steal the audience's heart, but that doesn't change the fact that understanding how we reason is absolutely essential to giving machines the ability to reason in a way a human would consider intelligent.

To pass the Turing test. 



# FEAR ALMA AGAIN



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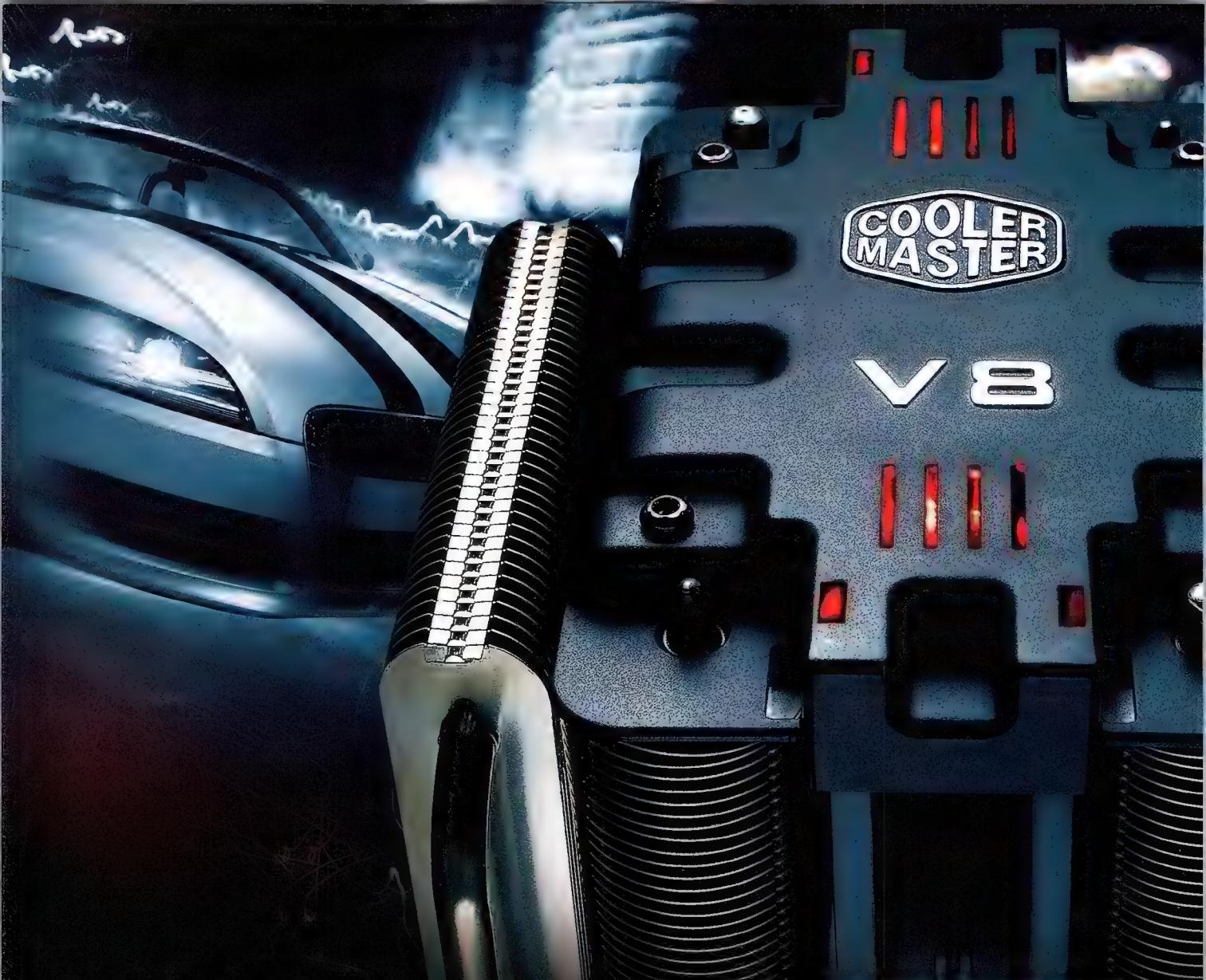
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# HARDWARE

## NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

It's graphics card central at Atomic this month. After rounding up budget graphics cards a couple of issues ago, we figured that there was another way to look at the graphics market without the pesky proliferation of brands getting in the way. This was born our ultimate GPU roundup – from the ATI 3870 all the way up to the latest overclocked beasts from NVIDIA, we look at every major model of card on the market today.

If there's a perfect card for you, we've got it here.

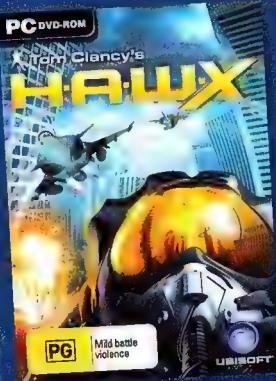
And, of course, we were very pleased to be able to deliver standalone reviews of the very latest NVIDIA cards – the much awaited GTX285 and 295. We've been crowing about ATI's comeback for months, but this latest set of releases kicks the big red one on its arse.

But it's not all pixel pushing, as we've got a Foxconn mobo, RAM kits from OCZ and Patriot, cooling gear, and a range of PC cases to suit all cases – and another new gaming laptop!



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# HOW WE TEST

We do a lot of testing in our labs, and we look long and hard at every piece of hardware to determine whether or not it passes muster. From taking a new card out of its packaging, to bundled extras, to performance, every facet of a given piece of kit's 'user experience' is under scrutiny.

In some instances, we have tough benchmarks to help us rate gear. For a CPU or a graphics card, raw performance is of course the most vital stat as whether it stinks or smells like roses. But there are other things we pay attention to in the review process.

Value for money is an important consideration, especially during the current financial climate. High end gear is expensive enough as it is, so we also look for good bundles. For instance, a graphics card that comes with a game or two, all the cabling you'll need, and little surprises like tools and other bumpf will score higher than a card that costs similar, but doesn't give you any presents.

Build quality is another thing we rate. From a PC case to a motherboard, we like our hardware well made and capable of taking a bit of punishment. We also like any included manuals to be clear and concise.

A lot of what we look for can be hard to put into numbers, we admit, but we try to think about what any enthusiast would think about their new gear after laying down money for it, installing it, and then using it.

And our benchmarks help, too. We've tried to pick a suite of games and applications that anyone can get access to, so that you – the reader – can easily compare your own gear with the kit we have in each issue. In fact, we'd recommend to all our readers that they run all of these tests on their systems and save the results, so you can always have a familiar benchmark of your own to compare to the latest gear in Atomic each issue.

## HOT AWARD WINNERS!

ISSUE 98

Just some of this month's HOT AWARDS...

### INNO3D GTX285 OVERCLOCK

"Great value, two games, pre-overclocked, and great performance. What's not to like?"

90/100

### XFX 4850

"Performance is great compared to the stock card..."

90/100

### GIGABYTE GTX295

"NVIDIA has bounced back with this card, regaining the pole position and a place in our hearts once again."

90/100

### SEAGATE BARRACUDA 1.5TB

"...you're getting 6.2GB for every dollar you spend – that kind of value is amazing, and it's only going to get better."

90/100



Our gaming test rigs: NRG systems with Phenom 9850 CPU, 4GB of DDR2 RAM and a 4870X2 graphics card. The mainstay of our games testing.

# CPU Benchmarks:

## Hexus PiFast

<http://pifast.hexus.net/pifast.php>

PiFast is a program that essentially calculates pi to a set amount of decimal places. It is a single-threaded application (one core/thread) and we run it at ten million places (10,000,000) using the Chudnovsky method, in the standard mode with no compression, and a FFT length of 1024kb. The program is free, so feel free to run it on your CPU and compare. Memory bandwidth plays a significant role in the final performance of this program, so be sure you bump up the frequency as well as the CPU clock!

## wPrime

<http://www.wprime.net/>

"wPrime uses a recursive call of Newton's method for estimating functions", says the website as it attempts to explain in plain English what it does. What it does is, essentially, complex square rooting and other number functions, which are able to be split up evenly between multiple cores, or simply run on a single core. We use wPrime 32M in both single and multi-threaded. The results of the single run are divided by the results of the multi run, and this gives us the efficiency of the CPU being tested – very useful knowledge to have when comparing chips and evaluating the benefits of overclocking.

## Cinebench R10 x64

[http://www.maxon.net/pages/download/cinebench\\_e.html](http://www.maxon.net/pages/download/cinebench_e.html)

Cinebench is a stalwart benchmark, and is one of the more entertaining ones to watch. It focuses on rendering an image at 800 x 600 resolution, complete with ray-traced light effects and much more. This is able to be run in either singlethreaded or multithreaded mode, and efficiency is calculated exactly the same way as for wPrime. Simply download the .zip file, extract, and run! The program also supports up to 16 threads in total, and even eight threads with Nehalem is an impressive sight to see. The difference in performance between 32- and 64-bit is minimal – just keep that in mind if your results for the same setup are slightly different.

## Everest Ultimate Edition

<http://www.lavalys.com/>

Everest is a system information tool that monitors voltage, temperature, as well as reporting on a massive list of other areas of your system. Hardware and software are noted here, but perhaps the most useful part of this program is the memory benchmarks. Ready for the fastest of dual/tri-channel memory, this tests the read and write bandwidth as well as latency. The program is a small download, but keep in mind that you only get a thirty day trial until you purchase the full version – something recommended if you're into getting the most info about what your tech is up to.

# GPU Benchmarks:

## Crysis

<http://www.ea.com/crysis/>

When Crysis was released, it was the beast that literally broke many so-called hardcore rigs, reducing the owners to tears. Even now, more than a year after the game's release, this game is still exceptionally graphically challenging. As such, it's the perfect choice for our testing, and something that you can test, too, if you've got a copy – just set all the settings to High, with no AA/AF, DirectX 10 and a resolution of 1,280 x 1,024 – and go for your life! Results are recorded as the last result of the final benchmark passthrough, to give the fairest comparison.

## NEW! Race Driver: GRID

<http://www.racedrivergrid.com/>

GRID, as some racing aficionados will know, is one of the most fun games of its genre to come about for quite some time, giving an accurate damage model along with realistic handling and a great visual style. Not only that but it is also very scalable over multiple GPUs, and is also capable of running on lower-end gear. We chuck all the settings to High, with 8xMSAA, at 1920x1200 for this test, using FRAPS to monitor the frames per second as we tear around the track for a single lap in our car of choice -- the Nissan 350Z.

## 3DMark 2006

<http://www.futuremark.com/benchmarks/3dmark06/introduction/>

Designed as a benchmark for DirectX9 based systems, 3DMark 2006 (or 3DMark06) has been a staple of the enthusiast diet for many years. With four graphical tests, and two CPU tests, these combine to give a final overall score that allows direct numerical comparison to any other system in the world and, best of all, it's completely free. Just head to the URL above, and download your copy to compare to any of the reviews in the mag. All of the tests are run at stock settings, so just install, run, and compare – it couldn't be easier!

## 3DMark Vantage (2008)

<http://www.futuremark.com/3dmrkvantage/>

As the first extremely convenient benchmark program around for DirectX 10, 3DMark Vantage is a new contender in the benching scene – and is proving very popular. While you can download and run it for free, this is only once, requiring a small fee to register your copy (though the bragging rights for showing off your rig may be worth it). Some graphics cards will even give you a copy! We run this at stock settings, which is the most appropriate for comparison between our results and yours. This is also significantly better at multi-gpu performance scaling efficiency.

# Foxconn Renaissance X58

Not included: Soundtrack CD.

Price TBC Supplier Altech

Website [www.altech.com.au](http://www.altech.com.au)

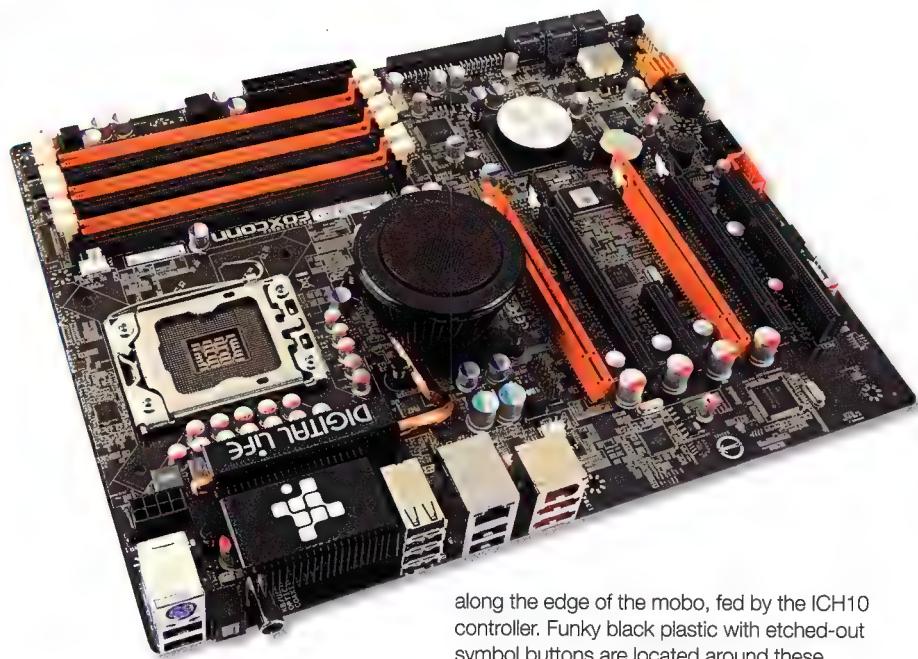
**Specifications** Socket LGA1366; Intel X58 chipset; ATX form factor; 4x PCIe x16; 1x PCI; 1x PCIe x4; 1x EIDE; 6x SATA; 2 SAS; DDR3-2133

**A**fter spending a solid minute fawning over the orange and black components on the very dark brown PCB (it looks rather stunning, after all), we managed to put the board down just long enough to get some benchmark scores, and of course, review it!

Built around the X58 chipset, which itself is manufactured on a 65nm process, this board takes advantage of pretty much every single available feature to the chipset (and even some more on top of it). Four physical PCIe X16 slots are fed by 32 PCIe lanes, giving either dual 16x Crossfire/SLI, or up to quadruple 8x Crossfire. The remaining four lanes provided by the chipset are in the form of a PCIe X4 slot.

At the back panel of the mobo there are quite a few ports including eight USB, PS/2, optical/coaxial digital output, Ethernet, Firewire and two eSATA ports. The latter are driven by an onboard chip. There's a large part of the northbridge cooling array here as well that allows some cool air to flow through it. Audio is provided through an add-in card called the 'Harp', which simply takes the onboard Realtek sound chip and moves it to a riser card. This should reduce some of the annoying electrical noises that some motherboards have, however, and plugs into a header just above the top PCIe slot.

The chipset cooling is why we wanted that soundtrack CD – at first glance we thought it was a speaker! Instead, this is an aluminium-finned heatsink with a clever imitation diaphragm, speaker cone and mesh. Underneath it is a curled heatpipe that joins the power regulation's heatsink. Sadly this



potentially aurally-impressive system is less than impressive when it comes to cooling ability, heating up very quickly and becoming almost burning to the touch (the southbridge's small silver disc almost singed off our fingerprints!). A lot of airflow is not only recommended, but needed here.

Power filtering around the CPU socket is very nice, with plenty of solid caps and ferrite chokes to keep the electrons flowing reliably. There's also enough clearance on all sides to use large coolers, and most won't interfere with the memory at all. The six DDR3 slots are actually in a damn good place, far out of the way of the graphics card and any other potential interference. Power for the mobo and CPU is also very well-placed, and easily accessible.

Right-angled IDE, and six SATA ports (in the same cable-pluggingly handy orientation) are

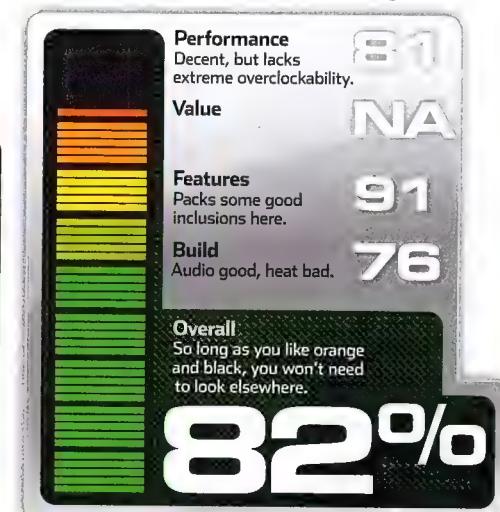
along the edge of the mobo, fed by the ICH10 controller. Funky black plastic with etched-out symbol buttons are located around these functioning as power, reset and clear CMOS. These oddly don't light up until the board is on, and it was only because we noticed the silkscreened text for the CMOS button that we actually know what it did – an exclamation mark in a triangle isn't quite... intuitive.

Along the bottom edge there are the usual headers, a mounted speaker, a removable BIOS chip and two SAS ports. These can be used with enterprise drives, and the motherboard comes with all the cables that you need to use them, as well as the other normal SATA cables. The bundle is actually pretty well rounded, if you're into a lot of cables that is.

Sadly for all these features, the board isn't a stellar overclocker. We bumped our i965 up to a QPI of 160, but was not stable enough to finish Cinebench when multithreaded. 

## Foxconn Renaissance X58

	i965	133x24; DDR3-1600 8-8-8-24; 3.2GHz	150x24; DDR3-1500 8-8-8-24; 3.6GHz	160x24; DDR3-1600 8-8-8-24; 3.84GHz
<b>PiFast</b>	27.68s	24.49s	24.35s	
<b>wPrime 32M – single thread</b>	37.066s	32.822s	30.843s	
<b>wPrime 32M – multi-thread</b>	7.689s (4.82x efficiency)	6.787s (4.84x)	6.426s (4.80x)	
<b>CineBench R10 64-bit – single thread</b>	4505	4989	5411	
<b>CineBench R10 64-bit – multi-thread</b>	18420 (4.09x efficiency)	20944 (4.20x)	n/a, failed	
<b>Everest Read</b>	14699MB/s	16419MB/s	18192MB/s	
<b>Everest Write</b>	11946MB/s	13465MB/s	14377MB/s	
<b>Everest Latency</b>	36.2ns	31.8ns	31.0ns	



# ASUS 4870 Matrix

So leet it needed an extra E...

Price \$TBA Supplier ASUS

Website [www.asus.com.au](http://www.asus.com.au)

**Specifications** 770MHz core; 920MHz memory (1840 effective); RV770 core; 800 shader units; 512MB GDDR5; 256-bit memory interface; dual slot PCB with active cooling; dual 6-pin PCIe power connector

**A**SUS has taken a vested interest in their Matrix branding of late, whacking that kind of cooler on a lot of cards. Past ones we've looked at have been rather noisy, but have provided exceptional cooling performance. Can this one stand up to the legacy left by its predecessors, or will the performance skip a generation?

Based around the RV770 core that has had a lot of attention, love and care the past few months, this card has a slight overclock of 20MHz on the core and memory respectively. We're not quite sure why ASUS went with such a small overclock, especially considering that the ASUS 4870X2 TOP was pushed up by 25MHz, and had the stock cooler. The good news is that you'll be able to push the card further yourself. This card has inherited the same amount of memory as the reference design, with 512MB of GDDR5 running on a 256-bit memory bus. With plenty of bandwidth, and a decent amount of room for textures, you'll have plenty of space to play around with here.

Moving on to the cooler, it's a pretty impressive design. Four thick heatpipes mate with a copper base, drawing the heat away from the power-hungry core and taking it to one of two circled aluminium fins, as well as the rectangular area of fins just behind the ASUS logo. Inside each of these two circled areas resides a fan, one slightly smaller than the other, and both working together to cool the card. As



a very cool feature, the smaller of the two fans is thermally-controlled to only activate when the temperature of the card reaches a certain amount. Sure, the card hit this shortly after POSTing, and the fan remained on the whole time, but if you live somewhere especially cold you'll appreciate it. Just a shame that Australia doesn't have more snow!

Dual 6-pin power connectors supply the juice to give this family member its basic needs to function (electricity mostly), and there are also two Crossfire nipples along the top edge of the card. Continuing this two-centric design, there are two DVI ports present, and the card supports PCIe V2. The two fans are plugged in via two separate cables, though sadly have three pins and cannot be controlled via software.

Cooling performance is exceptional, with idle temperatures at a very good 45 degrees. Load

temps are only seven degrees more at 52 degrees, but here's the catch – noise. At idle, the fans

sat at a constant 66 decibels, with load giving a very uncomfortable 71.3dBA. This amount of noise is very annoying, and you'll want to have music or a game on to minimise the distraction (unless you're one of those people who keep their computer encased in sound-deadening lead panelling). We think that while this is great performance, the noise levels shouldn't have to be so high with so much leeway for temps.

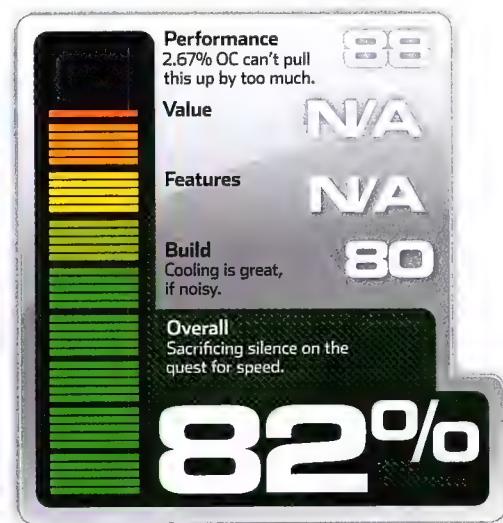
Performance for this card was pretty much what we'd expect from this core, with no real technical surprises to be discovered. After all, the core clock is only 2.67 percent faster than stock, which translates into an extra forty-odd 3DMarks in Vantage. There was also a knee-slappingly hilarious score given in 3DMark06, but apart from that everything was quiet on the excitement front here.

If you're after a card that will perform very well, and overclock too, this is a great choice. However, we don't think that this card is for everyone, and certainly not for those who value their peace and quiet – you won't want to sleep in the same room with this in your rig! 

## Asus 4870 Matrix 3d Mark scores



## Asus 4870 Matrix Gaming benchmarks



# Leadtek GTX285

The result of a very involved weightloss program.

Price \$700 Supplier Leadtek  
Website [www.leadtek.com](http://www.leadtek.com)

**Specifications** 648MHz core; 1242MHz memory (2484MHz effective); 1476MHz shader; GT200 core @ 55nm; 240 stream processors; 1GB GDDR3; 512-bit memory interface; dual slot PCB with active cooling; two 6-pin PCIe power connectors

**N**VIDIA is a funny bunch, releasing so many revisions of the same core architecture that we've run out of fingers to count on for some of them, and the GT200 core is looking to follow that trend, at least for a little while. Intended as the successor and possibly even the replacement of the GTX280, let's have a closer look to see if there's any changes that grab our attention for long enough to warrant a potential upgrade.

The eponymously named card is the third new NVIDIA card we've seen this month, so let's have a look at the tech inside. Core of choice with this card is the trusty GT200, previously manufactured on a 65nm process, but rejuvenated and reworked to be shrunk down to 55nm. This not only means that NVIDIA has 'caught up' with ATI in the process size, but that it can manufacture more cores on the one wafer, potentially meaning higher profits.

With 240 stream processors and one gigabyte of GDDR3 memory on a very wide 512-bit memory bus, these aspects of the core remain identical, and are unchanged from the first release. One thing that has changed (or three if you'd like to get pedantic) are the clock speeds, with the core bumped up by 46MHz, the memory by 142MHz, and the shader by 180MHz. The interesting thing is that even though speeds have been increased, power demand seems to have dropped, with just two



6-pin connectors  
needed instead of a  
six and an eight.

Physically and externally, the card is very similar in appearance to many cards released within the last year and a half. Encapsulated in a black (highly glossed) plastic shell, and beautified with some kind of golden mecha-warrior, the front of this card is pretty standard. Aluminium rails extend the length of the card and provide physical support to reduce bending and flexing, as well as helping to dissipate the heat generated by the core. This is taken away by (aided by what we can only assume is a copper slug in the base) a series of aluminium fins that not only transfer the heat from the card to the air, but also channel the air out the back of the case. In a departure from NVIDIA's usual style, the back of the PCB has been left uncovered, instead bared for all and sundry to see (not that there's too much back here except a lot of circuit traces, resistors and silkscreened logos).

Temperatures at idle were rather cool at 45 degrees and 58.5dBA, though load rockets up to 72 degrees and 61.8dBA. You might be able to squeeze some more speed out of this card, but don't expect miracles without better cooling. Thankfully the fan is PWM, so you can control it via software.

Performance is quite nice, returning solid scores in the benchmarks, with Crysis and GRID very playable. It's pretty much on par with what you could expect out of an overclocked GTX280 however, so don't upgrade to this if you already have one!

Leadtek includes a pretty good bundle with this card, giving you all the cables, driver and manual, as well as a copy of Neverwinter Nights 2. As much as this game has been used over the past year or two, it's still a great sign to see a company including one.

While we still wouldn't suggest that anyone with a GT200-based card upgrade to this, if you've got anything lower, you'll be getting a decent card for your money, and a little extra performance to boot. 

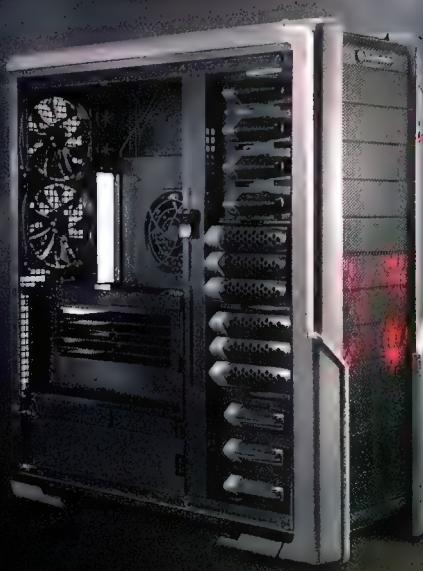
## Leadtek GTX285 3d Mark scores



## Leadtek GTX285 Gaming Benchmarks



# THINK EXCITEMENT THINK SPEED



**94%**

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# INNO3D GTX285 Overclock

Check out the bling!

Price \$650 Supplier Altech  
Website [www.altech.com.au](http://www.altech.com.au)

**Specifications** 700MHz core; 1280MHz memory (2560MHz effective); 1476MHz shader; GT200 core @ 55nm; 240 stream processors; 1GB GDDR3; 512-bit memory interface; dual slot PCB with active cooling; two 6-pin PCIe power connectors

INNO3D is a relatively well-known name in the budget arena, providing cards at a very affordable price, and usually chucking in a few extras to sweeten the deal. With the release of this newly updated core and card, the company has pulled out all stops to impress – something that we've definitely noticed – though we did get a shock when we saw the box!

Being the same packaging as their GTX280/260's (albeit with a new sticker), the box still has the *Company of Heroes* mascot soldier, almost giving us a heart attack when we thought they were still bundling this incredibly over-bundled and over-included game. Thankfully, two stickers on the front caught our attention shortly afterwards, and we realised that it didn't have the most annoying game ever to be included in a box for the millionth time, but instead had a full copy of *Far Cry 2* and *Warmonger!* The latter is a free download online, but it's still an awesome inclusion for people who may not otherwise know it exists, and is a fun demo of PhysX in the Unreal 3 engine.

We were suitably impressed by these inclusions, but even more impressed when we saw that the card was packed inside an antistatic bag, inside a cardboard box, wedged in foam, and then inside another box! You can be pretty damn sure that the card is going to get to you in very good condition, unlike some other cards that are merely held in with a cotton ball



and some goodwill. All the usual video cables and such are also included.

The card itself is based on the GT200 core that has been shrink-rayed down to 55nm. Running at a core speed of 700MHz (a 52MHz bump), with memory running at an incredible 1280MHz (38MHz more) and 240 stream processors working at 1476MHz, this card has been given a very sizable overclock – definitely more than we'd usually expect of a card like this. One whole gigabyte of GDDR3 memory on a 512-bit memory bus compliments these specs, giving oodles of room for all the ones and zeroes you'd need to be content.

Physically this card is the same as the reference build, consisting of the aluminium fins and block, as well as the large squirrel cage fan and plastic shroud. What's probably most noticeable about this card is the sticker all over the front of it – gold and black and similar in quality to book coverings from primary school.

Printed on this are ten rows of twenty three logos which, as well as the fan, give this card a total of two hundred and thirty one bloody logos – how many do we need!?

Apart from the inundation of branding, there are two DVI ports, analogue video out, two 6-pin PCIe power connectors, and two SLI nipples allowing up to Tri-SLI. The heatsink does a good job, idling the card at 44 degrees and 59.4dBA, loading at 71 with 60.1dBA.

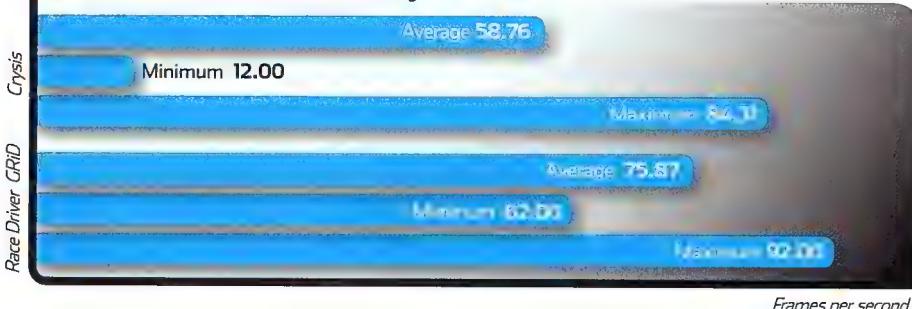
Performance is higher than the reference card in every test except the maximum framerate in GRID, gaining a couple of hundred points in Vantage, a hundred or so more in 06, and more frames across the board in Crysis. Annoyingly (and this has been displayed by the other cards in this series) there is a high pitched whining noise from the power regulation when very high framerates are being displayed, and those with sensitive hearing may get annoyed at this.

For a pre-overclocked card that not only comes with a recent game, and another title that most wouldn't have played otherwise, this is a great card and definitely meets our approval head-on, and leaves us begging for more. 

## INNO3D GTX285 Overclock 3d Mark scores



## INNO3D GTX285 Overclock Gaming Benchmarks



**Performance**  
The overclock gives it a very nice increase.

**90**

**Bundle**  
We really can't expect much more than this!

**95**

**Value**  
Not the cheapest, but definitely worth it.

**87**

**Build**  
23! AAAAH!

**83**

**Overall:**  
Great value, two games, pre-overclocked, and great performance. What's not to like?

**90%**

# GIGABYTE GTX295

The latest card from NVIDIA – or should that be sandwich?

Price \$860 Supplier GIGABYTE  
Website [www.giga-byte.com](http://www.giga-byte.com)

Specifications 576MHz core; 999MHz memory (998MHz effective); 1242MHz shader clock; GT200 core; 240x2 stream processors; 1792MB GDDR3; 448-bit memory interface; dual slot PCB with active cooling; 6-pin, 8-pin PCIe power connector

**N**VIDIA have had a little quirky obsession since the tail-end of the seven series, in that they seem to have a compulsion to whack two graphics cards together as one. It's only logical to assume that if you have one, then two must be better, and that's exactly what has been done here. Will this sandwich provide enough tempting fillings to upgrade?

While past cards in this vein have been two of the highest-end cores put together, this card is running the GT200 core with 240 stream processors. This means that the card is essentially two GTX260s running in tandem with the same core, memory and shader clock. Memory size has remained the same, with 896MB per core giving a combined total of 1792MB (although since the data is duplicated, you really only get 896MB – but hey, it looks cool on the box!). A 448-bit memory bus keeps this GDDR3 connected and fed, with plenty of data and capacity. Each core is built on the 55nm manufacturing process and the card supports PCIe V2, although it is backwards compatible with PCIe V1.1.

Physically this card is very impressive, and certainly a very different design style. Two PCBs have been arranged so that their cores and memory face each other. A heatsink is 'sandwiched' in the middle of these two, with a black shroud around the lot. This shroud is



made of some kind of rubberised metal, and not only holds the fan but protects the backside of one PCB. At each core, three thick heatpipes (for a total of six) carry heat away, bending down then up again through a collection of thick aluminium fins.

Air is drawn in at the end of the card, and pulled along past all these fins, to be exhausted outside the back of the case, and directly out the top of the card. All that metal means that while it is heavy, the card is well-balanced, and doesn't feel unwieldy. The squirrel-cage fan used with the card is controlled with a 4-pin PWM cable, which means that you'll be able to control the fan speed very easily through software. Connectivity options on the PCI bracket are pretty good, with dual DVI and a single HDMI. There are also two LEDs here, one green and one blue. The green

one shows that the power cables are plugged in, but the blue just seems to be decorative (perhaps there's a surplus of them?).

The GTX295 idles at 55 degrees celsius with a noise generated of 57dBA. At load this increases to 78 degrees, and 65.3dBA.

Performance of the card is really what is interesting with this card, so we'll jump right into it. 3DMark06 returned a score of 14491, and compared to the 4870X2's score of 15317, this is annoyingly less powerful. Thankfully, it hasn't set a precedent for the remaining scores. 3DMark Vantage shows a massive score of P18998 (the X2 got P9358), the highest from any single card we've seen yet. Crysis gave us an average of 21fps faster than the X2, giving the GTX295 the performance crown.

We did get a retail sample of this from GIGABYTE, and the package contained manual, driver CD, as well as molex to PCIe cables in both six and eight pin forms. No game was included.

NVIDIA has bounced back with this card, regaining the pole position and a place in our hearts once again. Fickle, ain't we? 

## GIGABYTE GTX295 3d Mark scores

3DMark 06 • 14491

3DMark Vantage • 15317

Score

## GIGABYTE GTX295 Gaming benchmarks

Average 54.13

Minimum 32.70

Maximum 80.50

Average 70.50

Minimum 48.00

Maximum 104.00

Frames per second

Crysis  
Race Driver GRID

**Performance**  
Takes top spot in the rankings.

**Value**  
Not amazing, but still nice value.

**Bundle**  
Bare necessities, no extras.

**Build**  
Very functional, but not exemplary.

**Overall**  
A great addition to the graphics scene.

**90%**

# XFX 4850

An ATI card, by XFX? OMGWTFBBQ!

Price \$TBA Supplier XFX  
Website [www.xfxforce.com](http://www.xfxforce.com)

**Specifications** 650MHz core; 1050MHz memory (2100MHz effective); RV770 PRO core; 800 shader units; 512MB GDDR3; 256-bit memory interface; dual slot PCB with active cooling; 6-pin PCIe power connector

If you're anything like us (and there's a very good chance you are), you've just looked at the picture to the right, and felt a funny tingly feeling in your groinal region. Not just because it looks so sexy (think hybrid stealth bomber postbox), but because of who made it – XFX. On the 17th of December, 2008, XFX announced a deal it had secured with AMD/ATI to begin producing that flavour of graphics cards. This doesn't mean that they're going to stop manufacturing NVIDIA cards – but we can now get both of them!

Out of its already quite impressive range of ATI's four-series cards, we grabbed the very coolest one and slammed it unceremoniously into our test rig to grab some benchmark scores. Before even that happened, we spent a few minutes caressing the card. The very first thing that we noticed, that you sadly can't see well in the picture, is that the PCB is coated in a very impressive matte black material, leaving only the components and mounting screws uncovered. This coating makes the circuit traces stand out, and is going to look particularly good in a windowed case.

Flipping over, you can clearly see the tough plastic shroud. This is made up of predominantly sharp and angular lines, the edges slanting away powerfully, hinting at the power beneath. Even the fan receives this treatment, framed in an octagonal shape as opposed to circular, and the whole shroud is designed unlike anything else



we've seen. Since it's as good a time as any to say it, XFX designers – keep up the hard work!

Underneath the tough shell is an even tougher heatsink, consisting of a large block onto which aluminium fins are extruded, allowing airflow across and through these fins, taking heat and dumping it out the back of the case. Twin DVI ports (with red plastic inserts instead of the standard white), analogue video out, dual Crossfire nipple tabs, and a 6-pin power connector round up the rest of the features on the card.

We couldn't read the temperatures through our usual method (GPUz reported a core temperature of minus a degree, and a PCB temperature of 32767.5 degrees – considering that the surface of the sun is only 6000, we thought this was a little... off), so instead used our alternative. Under load, the shell became uncomfortable to touch, but never burningly hot,

and idle was merely warm. For some more precise measurement, the card made 68.4dBA load and 63.9dBA idle – rather loud, and much louder than the reference cooler.

The packaging for this card is very nice as well, with everything fit snugly into place. You'll get the card, power cable, DVI to VGA and HDMI adaptors, as well as driver CD and a manual. Sadly, you don't get a game; this is something that would have sweetened the deal somewhat.

As the title would suggest, this card is a 4850, running the RV770 PRO core at a core speed of 650MHz, a very modest increase of only 25MHz. The memory runs noticeably higher, an increase of 57MHz over the stock of 993MHz, giving the 256-bit bus plenty of wriggle room to keep the half-gigabyte of memory filled.

Performance is great compared to the stock card however, with Crysis getting an average of two more frames per second, and GRID giving a smoothly playable result – though it did dip down in areas when large objects drew in. Synthetic benchmarks are nice too, with a very tasty result in both 3DMark programs.

If you can stand a little noise, you'll love XFX's first foray into the Red Zone, and we'd have no worries recommending this card to any enthusiast! 

## XFX 4850 3d Mark scores



## XFX 4850 Gaming Benchmarks



# acer

## Hot Summer Sale

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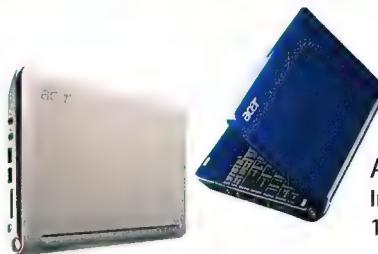
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# Zalman CNPS9900LED

You'd be forgiven for thinking this was a donut.  
Hmm... donuts...

Price \$95 Supplier Altech  
Website [www.altech.com.au](http://www.altech.com.au)

Specifications Tower cooler; three 4mm heatpipes; one 12cm fan; 100% copper

**Z**alman has been the creator of a very many popular heatsinks for both CPUs and GPUs over the past couple of years. With a penchant for exotic shaping, interesting designs and a tendency towards the quiet end of 'did you hear something?', we decided to grab its latest design and see how it stacks up to our current best, and whether or not it's worth your time.

True to form, and perhaps carrying more meaning in there than we intended, this heatsink is based off the preceding CNPS9500 series coolers. It consists of three heatpipes, each originating at the base, curving upwards through the circular array of fins, and finally ending in the base once more. This gives an effective six paths for heat to travel, and being soldered to the

0.2mm thick copper fins means that the transfer and radiation of that heat is excellent. A very polished copper base forms the perfect surface, and is perfectly flat – we couldn't feel any scratches at all!

Mounted in the centre of the radial fins is a frameless 12cm fan, mounted instead by plastic clips. It's PWM powered, blue LED lit, and has ball bearings meaning that this fan on all accounts should be quiet. What we recorded was an idle noise of 55.5dBA and a load of 61.8dBA, meaning that this heatsink was quite audible throughout testing, and it created enough vibration to be felt throughout the whole motherboard – make sure you secure both the board and cooler securely.

The performance of this cooler is quite good compared to the Thermalright (which is \$30 more), and should definitely serve you well if you're intending to get some Nehalem



overclocking action done. It's also compatible with LGA775 and AM2+, so you're covered on all bases! If the looks are appealing, this is a very nice alternative to the stock cooler. 

## Zalman CNPS9900LED

	920	Zalman CNPS9900LED	Thermalright Ultra 120 Extreme	
	Load	Idle	Load	Idle
3GHz, 1.325V	65	43	58	39
3.66GHz, 1.45V	79	46	73	42



# Seagate Barracuda 1.5TB

The bitey drive with a lot of storage.

Price \$242 Supplier Seagate

Website [www.seagate.com](http://www.seagate.com)

Specifications 1500GB; 3.5" form factor; SATA 3Gb/s

**T**he first hard drive that Seagate ever made was called the ST506, which fit into two 5.25in bays, and held a grand total of 5MB storage. Back when it was released in 1980, it cost many hundreds of dollars (\$US1500 to be exact), and was more space than the average user knew what to do with. With a speed of 3,600RPM and access time of 85ms, this wasn't exactly what you'd call a performance drive. Boy, how far hard drives have come.

With manufacturing technologies constantly improving, and materials becoming available to take advantage of these refined techniques, what used to take up a huge amount of room can now be compressed down into the standard form factor of 3.5in. With 1,500 gigabytes of storage space and a rotational speed of

7200RPM, this drive has an access time of 13.7ms, an average read speed of 117MB/s, and an average write speed of 107MB/s, making this quite a fast drive.

This drive managed to remain pretty quiet during testing, and did not get too warm under heavy accessing (though some airflow across it can never hurt for longevity's sake). You'll be able to fit a lot of games on this drive, and this should be plenty of room for even above-average space users. Just keep in mind that if you're going to be RAIDing a couple of these together that if something goes wrong, you can potentially lose three or more terabytes in one go, so make sure you take adequate precautions.

Seeing how far this tech has come in 29 years is incredible. We've gone from \$US300/MB in 1980, to \$0.0016/MB in 2009. Put another way, you're getting 6.2GB for every dollar you spend – that kind of value is amazing, and it's only going to get better. 



# OCZ DDR3 kit

They're black! And lumpy!

Price \$509 Supplier OCZ Technology  
Website <http://www.ocztechnology.com/>

Specifications 3x 2GB kit; PC3-12800; DDR3-1600; 8-8-8-24; 1.65V; 240-pin DIMM; Non-ECC Unbuffered DDR3; XMP enabled

**F**irst off, you have to ask yourself a question; what is black, green, and sticky? – memory sticks, of course! (groan! –ed)

Lame jokes aside, OCZ has entered the fray which is (quite literally) becoming flooded with triple-channel kits from all the major manufacturers, and almost all of them similarly spec'd. These sticks, sadly, are no different and follow the tried-and-true safer course. Rated

## OCZ DDR3 kit

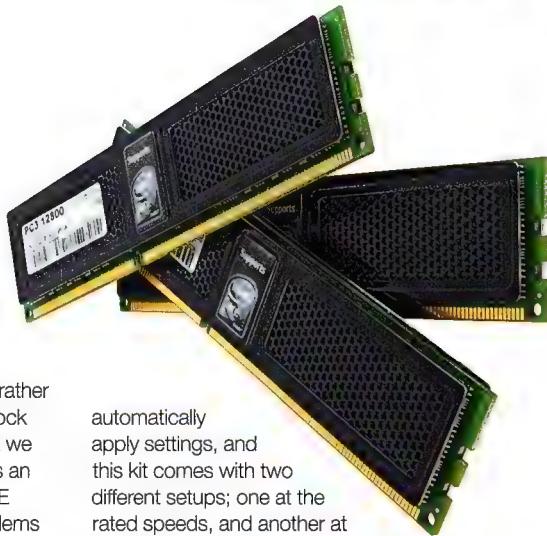
i920	1400MHz; 6-6-6-20 (TT); 1.68V	1080MHz; 7-7-7-20 (TT); 1.65V
Hexus PiFast	24.14s	31.17s
wPrime 32M8x	6.687s	8.687s
Everest Read	15513 MB/s	12495MB/s
Everest Write	12669 MB/s	9770 MB/s
Everest Latency	36.1 ns	42.2ns

at stock to have a speed of 1600MHz, at 8-8-8-24 timings on 1.65V, these sticks are the same as the other two kits we've looked at, at least on paper.

Off the paper and into our test rig however, we found that the memory was rather uncooperative, and wouldn't run at the stock settings set by hand no matter how much we fiddled and poked. We're not sure if it was an issue with the GIGABYTE EX58-EXTREME mobo used, but we haven't had any problems with it before. As we are want to tinker however, we quickly messed around with the settings and found some that worked – as well as being a little perplexing. The one thing that they definitely are is amazing, and the performance afforded here is very nice.

Physically these sticks are pretty standard, with a typical green PCB, and eight memory chips per side that add up to a total of sixteen. Stuck on top of these chips are black heatspreaders, with a mesh that resembles a screen door, that take the heat and dissipate it effectively – though they still got a little warm under load.

These sticks also come with XMP (Extreme Memory Profiles) that let X58 chipsets



automatically apply settings, and this kit comes with two different setups; one at the rated speeds, and another at 1800MHz with 9-9-9-28 timings, all at stock volts of 1.65V.

For the price these sticks are quite good, and if you're prepared to give them some loving and time, can be just what you want. 

### Overall

Not the best kit we've seen, but definitely not the worst.

**82%**

# Patriot Viper DDR3 kit

Powder blue memory comes in triplets!

Price \$485 Supplier Patriot  
Website <http://www.patriotmem.com/>

Specifications 3x 2GB kit; PC3-12800; DDR3-1600; 8-8-24; 1.65V; 240-pin DIMM; Non-ECC Unbuffered DDR3

**W**e've come to know Patriot as a very welcome company in the Labs, sending us brightly-coloured and picket-fence-y shaped sticks of memory. Until now, we've been accustomed to receiving only two sticks – until our prayers were answered, and the first Patriot triple-channel memory kit rocked up.

With three identical sticks of memory, this kit

is designed especially to work with Nehalem (and even being associated with Nehalem makes our tech-senses tingle), so we set about figuring out if this kit is worth the dosh or not.

We punched in the stock speeds of 1600MHz and 8-8-8-24 timings into the BIOS of our X58-based motherboard, and fired up our first round of benchmarks. Results garnered here are exactly the kind of performance you can expect from the i920 chip, and no surprises leapt out of the sticks to scream at us that something was wrong. Then, naturally, we took the stock specs and tweaked them a bit, reducing the frequency and latency to see what would happen.

Keeping the sticks at stock voltage, we managed to get them stable at 1080MHz with CL7 timings, which actually gave us a slightly faster result (though strangely write speeds remained the same throughout multiple runs of the benchmark).

The sticks didn't get too warm under load either, with the blue-coated aluminium heatsinks doing a very good job of keeping the temperatures down. In another life they could



have been very sturdy salad tongs, but for their intended purpose they excel, giving you the ability to overclock them without fear of meltdowns. 

### Overall

A very smart buy, but don't expect to push them incredibly far.

**91%**

# SilverStone 'Raven' RV01

Channeling more F-117 Nighthawk stealth bomber than any other case!



Price \$265 Supplier Altech  
Website [www.altech.com.au](http://www.altech.com.au)

**Specifications:** 280 x 616 x 660mm (W x H x D); 1x 120mm Fan (top); 2 x 180mm Fan (internal intake); 5 x 5.25in drive bay (external); 6 x 3.5in drive bay (internal); ATX, E-ATX, M-ATX; SECC Steel with windowed panel, plastic external shell.

**Gallery Link:** <http://www.atomicmpc.com.au/?134488>

**C**onstructed with a steel superstructure, with tough plastic panelling around, this case is exceptionally well built – living up to SilverStone's usual standards. Starting at the front fascia, you'll notice that it has an inset 'stealthed' drive bay system. Simply push in, and slide the door down until it clicks, and when you push it again it'll even raise itself back into place! It makes a bit of noise while doing so, but it's very ignorable.

The top edge of the case has very large and easy to use power and reset buttons, as well as a stealthed panel for access to the two USB, Firewire, audio and headphone ports. Falling off to the side here, a very large side panel and angled window look stunning. Very thick and solid Perspex has been used for the window, surrounded on three sides by bevelled plastic flares, and a large vent underneath. The opposing side panel is identical to this, just without the window.

Underneath the case are four plastic and immobile feet, with rubber underneath to stop movement. Filtering is here for the PSU, and can be accessed without opening the case – very, very handy. In fact all the intakes of this case are filtered, stopping large particles of dust and hair

from getting in.

Around the back of the case is... absolutely nothing. You'd even be forgiven for thinking it were the front – because there's nothing back here! Smooth, sealed plastic is here, with only a small vent near the top edge, but why?

Because the ATX layout has been rotated 90° to the right.

To gain access into the case, two twist-locks undo, and half of the top grille slides out of place, revealing the not-quite-traditional 'back' panel. Complete with the usual seven expansion slots, 12cm fan and a large vent, this also has quick release catches for the panels – just slide them across and pull the panels directly out.

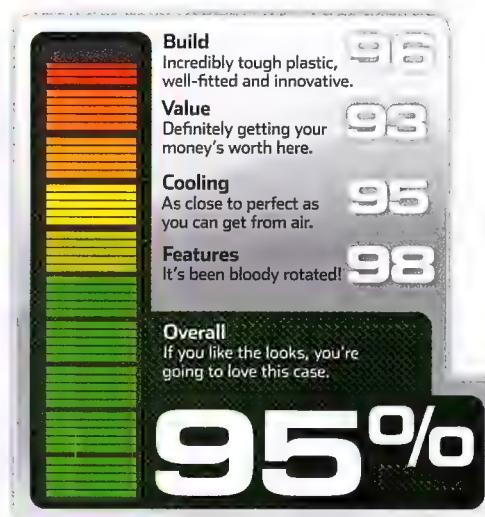
Inside the all-black interior, there are six tool-less HDD bays (the leftmost of which is hot-swappable), and five 5.25in bays that are secured with a simple rocker switch, just like a light switch.

The PSU is at the bottom of the case, along with room for a 12cm intake fan at the bottom if you'd like to add one. Dual 18cm fans are inset into the roof of this area, taking cool air in from the sidepanel vents, and passing it over the HDD bays as well as into the ATX area. This cool air will flow up all the motherboard components, into the CPU cooler and graphics card, and will blow right out the top of the case. Design-wise this makes perfect sense – after all, heat rises.



Two 18cm fans pushing air in, and only the one 12cm out, means that the case will have positive air pressure. There's plenty of room behind the mobo tray for cabling.

While we admit that the looks of this case might not be for everyone, the design is phenomenal, the build solid and the features well-populated. Atomic loves this case, and we're definitely looking forward to any mods done to it (check out the lighting tute on page 74!). 



# Antec Nine Hundred Two

Is a reworking of this popular case worth bothering with?

Price \$215 Supplier Altech  
Website [www.altech.com.au](http://www.altech.com.au)

**Specifications:** 218 x 493 x 472mm (W x H x D); 2 x 120mm blue LED Fan (front); 1 x 200mm blue LED Fan (top); 1 x 120mm blue LED Fan (rear); 9 x 5.25in drive bay (external); 6 x 3.5in drive bay (internal); ATX, M-ATX; SECC Steel with windowed panel.

**Gallery Link:** <http://www.atomicmpc.com.au/?135374>

Labelled as an 'evolution' of the original Nine Hundred case, the Nine Hundred Two (902) weighs in at roughly \$45 more than its predecessor – so should you drop the extra cash, or have the features added been largely superfluous?

Externally, you'd be forgiven for glancing at the 902 and assuming it was nothing new. It's only when you delve deeper into this case that you start to notice the differences, and these start early at the very top of the case. The front I/O ports include two USB, eSATA, and mic/headphone jacks, though the latter aren't labelled at all. You're going to have to trial-and-error these until you know which is which, a strange oversight. Thankfully this area is held up by the very good power and reset buttons, each responsive and firm to the touch.

Up on the very top is where the inset bucket used to reside, which has been replaced by a large flat surface area with grooves to hold onto whatever you decide to chuck up there. A huge 200mm fan is also up here, with a thick honeycomb mesh that will only protect against wayward fingers, so make sure you're wary of smaller items that can fall into your precious rig.

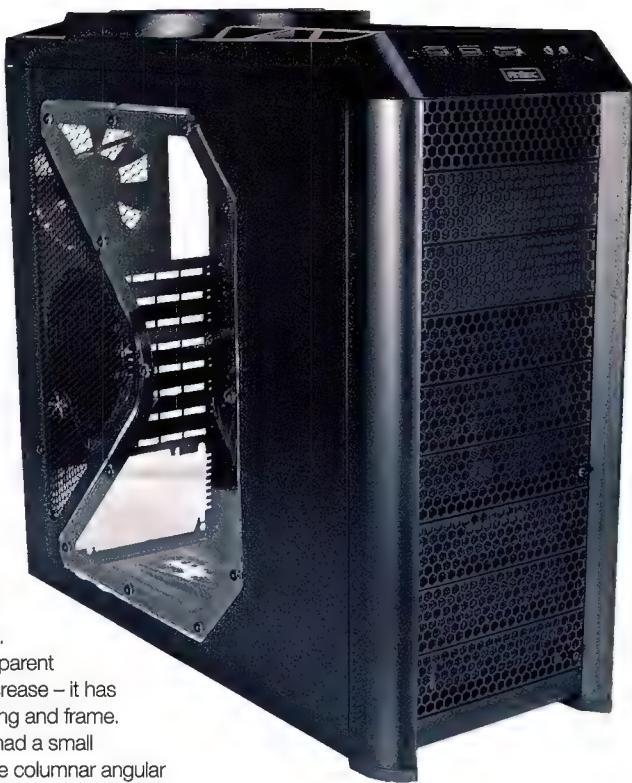
The back has a series of switches to control the speed of the top and rear fans (which is

a 120mm), as well as the LEDs in the top fan. Two soft watercooling grommets are here as well as the interesting addition of an extra PCI slot for a total of eight. This gives extra room for those lucky few with TriSLI or QuadFire to get enough airflow in, or even those who use PCI fan controller brackets.

The left-hand sidepanel has the same Pacman-esque shape as the original case, as well as a mount here for an extra 120mm fan. Opposite this is the other panel – which is bare – and both seem to have been constructed with thicker steel than the original. This becomes even more apparent with the extra 3kg weight increase – it has been packed into the paneling and frame.

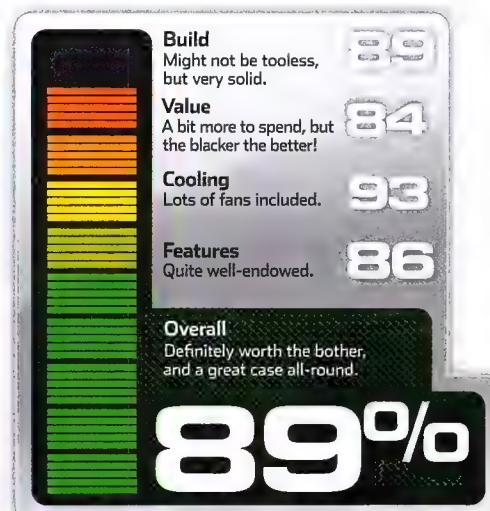
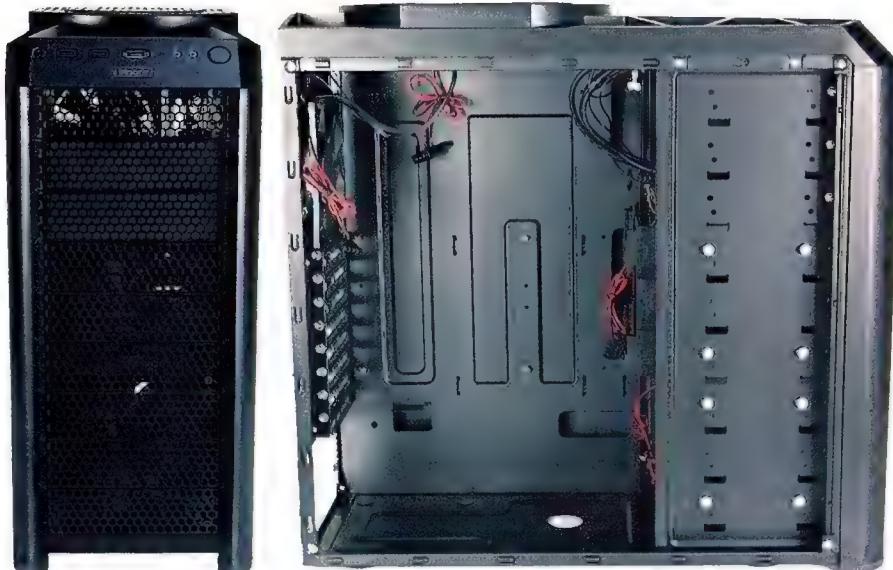
Even the front fascia has had a small reworking, retaining the same columnar angular sides with meshed drive bays, but adding two small dials to control the two 120mm intake fans. All the fans in this case are made of black plastic, with blue LEDs, and produce a very interesting effect when compared to the usual clear plastic. Not only that, but every intake is filtered to ensure only a minimal amount of dust can gain entrance.

One of the first things you notice when



peering inside the case is the colour, or lack of. The whole inside of the case, and every metallic part save the standoffs and a few screws has been painted black. This looks quite impressive, and will make the lighting look even better in a darkened room. While there are no quick-mount rails for 5.25in drives, they are installed in the now somewhat old-school manual method, using screws.

The PSU is located at the bottom, supported



# Thermaltake Element S

A case that is actually, well, in its element.

Price \$230 Supplier Anyware

Website [www.anyware.com.au](http://www.anyware.com.au)

**Specifications:** 2230 x 505 x 540mm (W x H x D); 1 x 120mm Fan (front); 1 x 230mm red LED Fan (top); 1 x 230mm Fan (side); 1 x 140mm Fan (rear); 3 x 5.25in drive bay (external); 2 x 3.5in drive bay (external); 5 x 3.5in drive bay (internal); ATX, M-ATX; SECC Steel with windowed panel.

**Gallery Link:** [www.atomicmpc.com.au/?135467](http://www.atomicmpc.com.au/?135467)

The foremost and most obvious part of this case from the front is the door. Made from smooth plastic with a very striking red trim, it's held in place with magnets strong enough to stop it from swinging open when you move it around, but sadly is also held on with a plastic bracket that may snap if you're one to kick your computer when the last Linux package refuses to install for the nth time. Just behind the door are nine drive covers, each easily removable with one hand, and filtered with foam for easy cleaning.

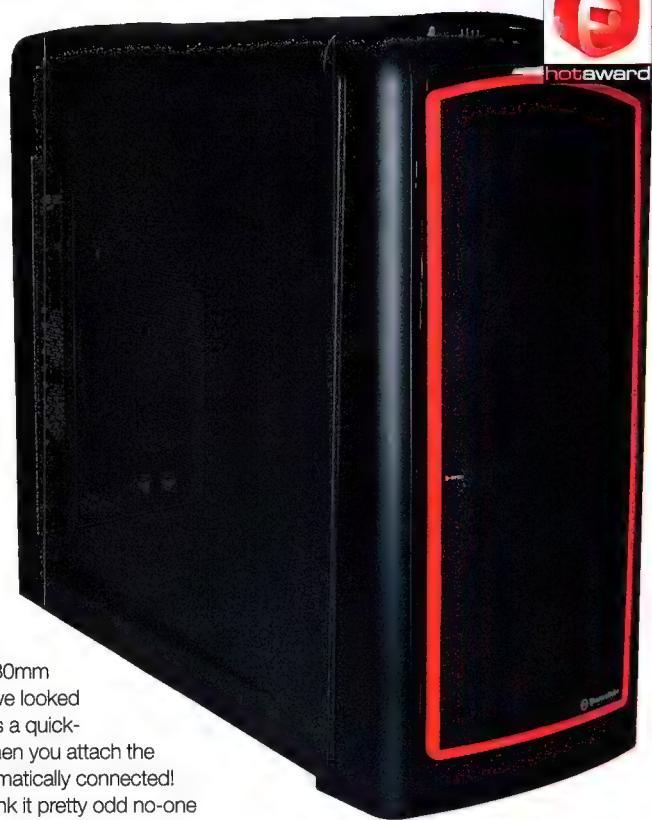
Up top there are two USB, eSATA, mic/audio, as well as the power and HDD lights. Power and reset buttons are also here; both are exceptionally responsive and reaffirm your touch with a soft 'click'. A single, raised lip runs down the length of the top side of the case, with slight bowing either side, and two meshed rectangles towards the back allow heat to escape. A 230mm red LED fan pushes air out here, as well as providing the only glow from the case, and should prove very nice in a darkened room.

The blackened rear of this case is pretty nice as well, with a 140mm fan, and space for two 60mm fans counting as the PCI ventilation (though if you use these loud and whiny fans here, we will have to kill you). Annoyingly, only one of the physical brackets is ventilated, and

the rest are the 'twist me off' kind – it would be better to have them simply screwed in and out. Speaking of screws, all the ones used in construction and included extras are completely black, as well as every single metal surface save the standoffs. This isn't just a powder coating of black, but a proper anodising.

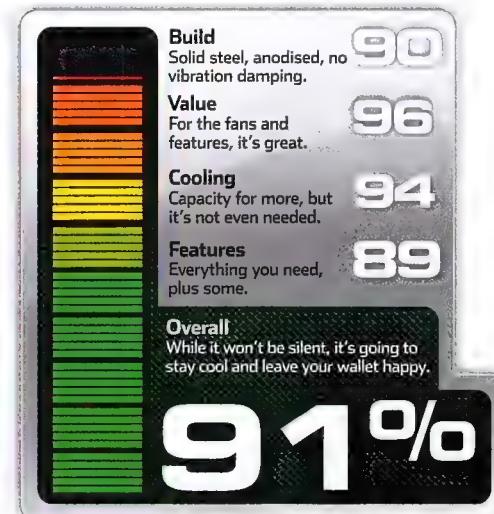
The right-hand side panel is indented with a thin mesh strip to allow airflow behind the mobo tray, and the left-hand has a large meshed window complete with 230mm fan. Just like the Spedo we looked at in Issue 97, this fan has a quick-connector that means when you attach the sidepanel, the fan is automatically connected! We love this idea, and think it pretty odd no-one had thought of it until now.

Inside the ATX area, there is a channel to the right-hand side to allow cables up and down, thick enough for the 24-pin cable and a few others, and the I/O cables have already been threaded here. There's a cut out square just behind where the CPU socket would be, allowing installation of coolers even with the mobo installed in the case, as well as two vents to let air behind the mobo. The PSU is in a separate chamber, with the baffle held in place



using thumbscrews, with filtering to prevent hair and such entering the case.

Incredibly, the fan cables are all a custom length and threaded to end up right next to the PSU. The cabling is great on this case, it's just a shame that there is next to no vibration dampening for the HDD bays and PSU, and the hard plastic feet won't dampen anything, either. Overall we like this case – and would love to see more along this vein with just a touch more attention to detail.  JR



# MSI GX720 gaming laptop

A budget gaming system? Colour us curious...

**Price** \$2049 **Supplier** MSI Computers  
**Website** [www.msicomputer.com.au](http://www.msicomputer.com.au)

**Specifications** Intel Centrino 2 P8600 @2.4GHz; 4GB DDR2 RAM; NVIDIA 9600M GT with 512MB; 320GB SATA HDD @ 5400rpm; DVD super-multi drive; 4-in-1 card reader; 4.1 speakers; Gigabit Ethernet; 802.11b/g/n WLAN; 3.2kg; comes with bag and Rainbow Six: Vegas 2

**M**SI has a... spotted reputation amongst some enthusiasts. We've been quite happy with a lot of the hardware manufacturer's recent performance, and the company's work with motherboards has come a long way.

But can that translate into a good gaming experience on a mobile platform?

The GX720 certainly looks the part. Red, it appears, is the stock colour of choice for gaming machines it seems, and MSI's effort has stuck firmly with the herd. It's offset by mostly black construction in a pleasing brushed aluminium on the monitor and wrist support, highlighted by shiny silver.

It is also a finger-print bandit – invest in tissues or wipes if you pick one of these up!

The machine has a mess of IO options scattered about its edges, including three USB ports, standard audio ports, eSATA, HDMI and more. It's connected, and the most well used ports are situated on the left side of the machine, where USB sticks and cables are well away from any desperate mousing action – unless you're a cack-hander. In which case, we're sorry. Get a real handedness!

The good load-out doesn't stop there, either – the GX720 is graced with a 4.1 speaker set-up that is, well, not the gruntest of mobile sound solutions we've seen, but certainly adequate.



were expecting. Crysis was the worst performer – it emerged battered, bleeding and concussed, with an average fps of 5.something, embarrassing in the timed demo. 3DMark06 staggered through its stuff, returning a score of 4,878 3DMarks, while Vantage returned a mere P1,631. If you look back at the scored in last month's gaming laptop round-up, the GX720 is easily the worst performer of the pack, though it's only a shade worse than the think-we-can

there's simply no way it's going to come close to handling modern games. Older fare will be fine, though we still suspect full settings on the Source engine might cause a hiccup or two. It's a great choice for folks looking for a solid notebook that has some pretensions to cool, and we can't argue that the price isn't nice; but really, it doesn't compete with the real mobile gaming systems.  DH

## But is affordability really what you want from a gaming machine? The obvious answer... yes...

The 17in monitor is a touch on the dull side, but it is crisp and easy on the eyes when working with text. The keyboard and mouse are solid, delivering good feedback, easy pointing and few typos. It even features highlighted WASD keys, though if you still need a hand to find these mainstays of modern gaming you're doing it wrong. A DVD-RW multi-drive rounds the extras out – standard stuff, really. One thing we did note is that machine is quite light for its size.

The guts of the machine are a Centrino 2 P8600 running at a stock 2.4GHz, 4GB of RAM (which, of course, is wasted on the 32-bit OS) and a 9600M GT graphics chip with 512MB of RAM. This is where that budget spec really starts to hurt the system.

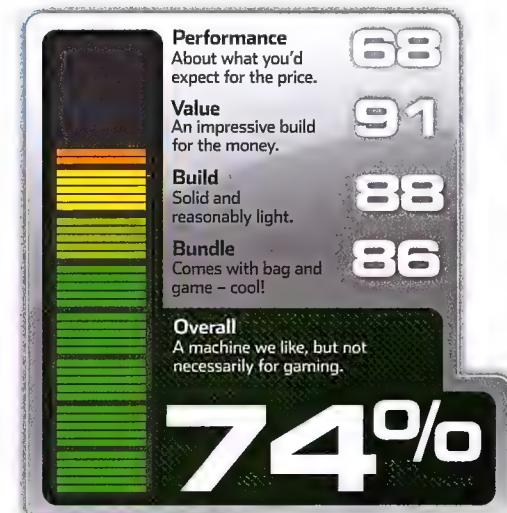
Performance is, well, even worse than we

contenders, the Macbook Pro and ASUS G71.

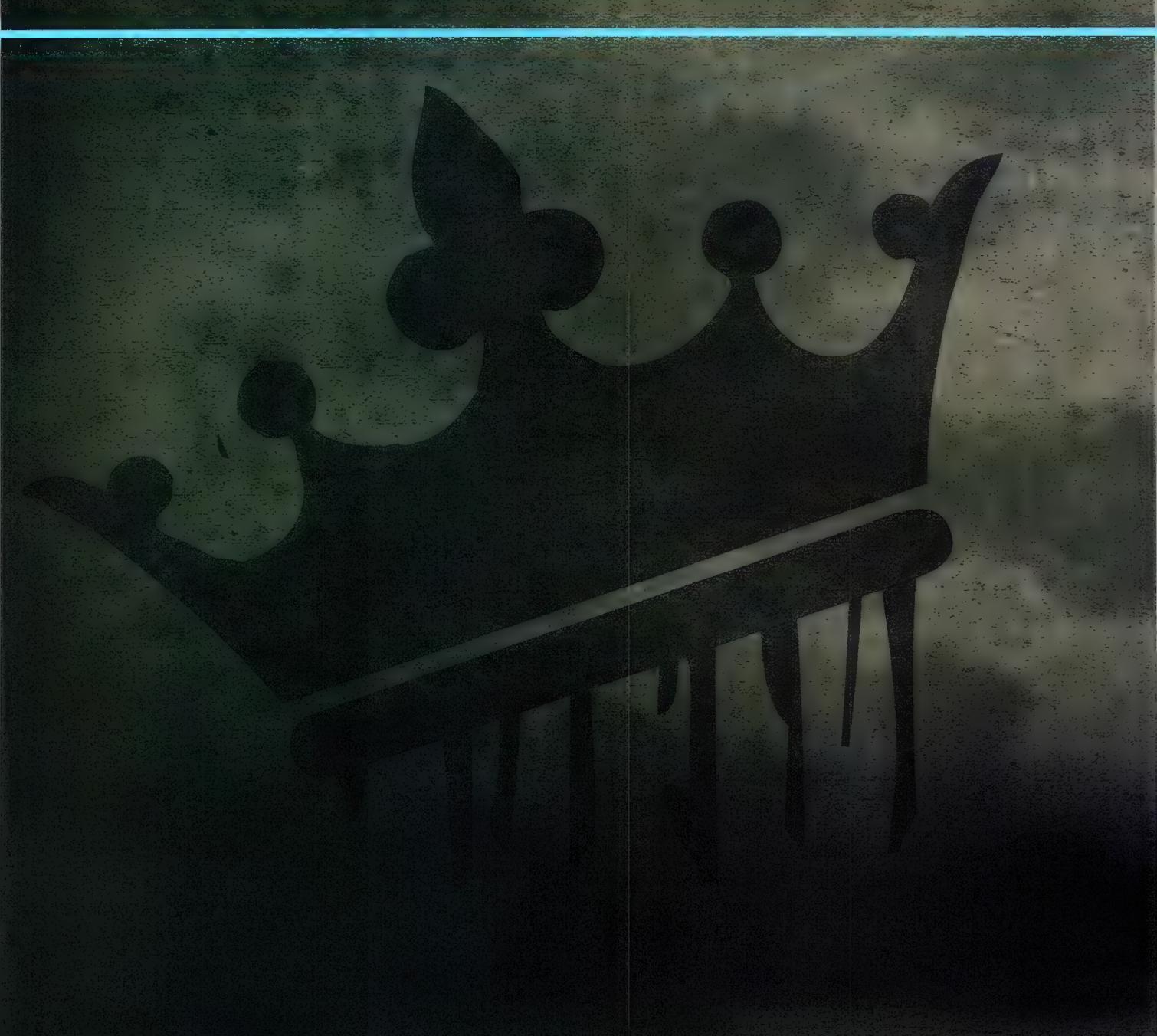
Oh, and did we mention there's a turbo setting, that you can switch on via the AV control panel above the keyboard? There is. Did we try it? Let's just say that it did nothing to change our poor opinion of such fripperies.

This is where we come to a conundrum; it is, after all, a budget beast – it only costs, \$2,049 of your hard-earned, placing it as easily the most affordable mobile machine we've looked at. But is affordability really what you want from a gaming machine? The obvious answer is 'yes, I want my cake and want to eat it, too', but that's just not going to happen. Performance equates to dollars in this space.

There's a lot to like about the GX720, the competitive price not the least of them, but



# Who's



# King?

There's been a monster amount of graphics cards released over the last 12 months, and still more available on shop shelves. So who's king of the mountain? We test 'em all to find out.

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### How we tested

- ATI Radeon HD 3850 and HD 3870
- ATI Radeon HD 3870 X2
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- Nvidia GeForce 8800 GTS-series
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- Nvidia GeForce 9800 GTX and 9800 GTX+
- Nvidia GeForce 9800 GX2
- Nvidia GeForce GTX 200-series

**Y**our graphics card has the greatest effect on which games you can play smoothly on your PC, as well as the resolution and quality settings you can use. This makes choosing a card one of the hardest decisions you'll have to make.

Although it's always good to have a choice, NVIDIA has done its level best over the last two years to flood the market with a horde of confusingly named products. What's more, many of these 'new' GPUs are nothing more than rebranded old products or slightly tweaked versions of existing products. For example, the 8800 GT and 9800 GT are, to all intents and purposes, exactly the same product – so why the name (and price) difference? To add to the confusion, there are two models of the GTX 260, one of which is slightly faster and more expensive than the other. This all makes choosing which NVIDIA-powered graphics card a difficult decision.

In contrast, ATI has staged a comeback in the last few months. The HD 4000-series GPUs provide competitive performance at an aggressive price. Unlike NVIDIA, ATI also appears to have a clear naming strategy: if you want a more powerful card, simply buy one with a higher number.

Still, with 20-plus different GPUs competing for your wallet, it pays to carry out your research properly, which is why we've also tested seven popular discontinued GPUs, so you can see how much extra performance modern GPUs deliver.



	ATI Radeon 1GB HD 4850	ATI Radeon 1GB HD 4870	ATI Radeon 512MB HD 4850	ATI Radeon 512MB HD 4870	ATI Radeon HD 3850
<b>Typical street price</b>	\$340.00	\$475.00	\$260.00	\$410.00	\$140.00
<b>GPU Frequency (MHz)</b>	625	750	625	750	668
<b>Texture processors</b>	40	40	40	40	4 (16 texture filter)
<b>Render outputs (ROPs)</b>	16	16	16	16	16
<b>Stream processors</b>	800	800	800	800	320
<b>Stream processor frequency (MHz)</b>	625	750	625	750	669
<b>Shader Model support</b>	4.1	4.1	4.1	4.1	4.1
<b>DirectX support</b>	10.1	10.1	10.1	10.1	10.1
<b>Fabrication process (nm)</b>	55	55	55	55	55
<b>Transistors (million)</b>	956	956	956	956	666
<b>RAM</b>					
<b>Bus width (bits)</b>	256	256	256	256	256
<b>Effective frequency (MHz)</b>	1,986	3,600	1,986	3,600	1,656
<b>Bandwidth (GB/sec)</b>	63.6	115	63.6	115	53
<b>Quantity (MB)</b>	1,000	1,000	512	512	256
<b>Type</b>	GDDR3	GDDR5	GDDR3	GDDR5	GDDR3
<b>Interface</b>					
<b>Additional power requirements</b>	6-pin PCI-E	2 x 6-pin PCI-E	6-pin PCI-E	2 x 6-pin PCI-E	6-pin PCI-E
<b>CrossFire/SLI compatible (maximum number of cards)</b>	CrossFire (2, 3 or 4 cards)				
<b>PCI-E version</b>	2.0	2.0	2.0	2.0	2.0
<b>Number of slots, length</b>	Single, 214mm	Dual, 240mm	Single, 214mm	Dual, 240mm	Single, 232mm

ATI Radeon HD 3870	ATI Radeon HD 3870 X2	ATI Radeon HD 4650	ATI Radeon HD 4670	ATI Radeon HD 4830	ATI Radeon HD 4850 X2	ATI Radeon HD 4870 X2
\$180.00	\$270.00	\$130.00	\$150.00	\$220.00	\$750.00	\$850.00
775	825	600	750	575	625	750
4 (16 texture filter)	2 x 4 (2 x 16 texture filter)	16	16	32	2 x 40	2 x 40
16	2 x 16	8	8	16	2 x 16	2 x 16
320	2 x 320	320	320	640	2 x 800	2 x 800
775	825	600	750	575	625	750
4.1	4.1	4.1	4.1	4.1	4.1	4.1
10.1	10.1	10.1	10.1	10.1	10.1	10.1
55	55	55	55	55	55	55
666	2 x 666	541	541	xxx	1,912	1,912
256	256	128	128	256	256	256
2,250	1,800	1,000	2,000	1,800	1,986	3,600
72	2 x 58	16	32	57.6	2 x 63.6	2 x 115.2
512	2 x 512	1,000	512	512	2 x 1,000	2 x 1,000
GDDR4	GDDR4	GDDR2	GDDR3	GDDR3	GDDR3	GDDR5
6-pin PCI-E	6-pin PCI-E, 8-pin PCI-E	N	N	6-pin PCI-E	6-pin PCI-E, 8-pin PCI-E	6-pin PCI-E, 8-pin PCI-E
CrossFire (2, 3 or 4 cards)	CrossFire (2 cards)	CrossFire (2, 3 or 4 cards)	CrossFire (2, 3 or 4 cards)	CrossFire (2, 3 or 4 cards)	CrossFire (2 cards)	CrossFire (2 cards)
2.0	2.0	2.0	2.0	2.0	2.0	2.0
Single or dual, 229mm	Dual, 266mm	Single, 168mm	Single, 167mm	Single, 210mm	Dual, 284mm	Dual, 267mm

# HEAD 2 HEAD

	Nvidia GeForce 320MB 8800 GTS	Nvidia GeForce 512MB 8800 GT	Nvidia GeForce 512MB 8800 GTS	Nvidia GeForce 640MB 8800 GTS	Nvidia GeForce 8800 GTX	Nvidia GeForce 8800 Ultra
<b>Typical street price</b>	\$430*	260*	260*	560*	850*	1000*
<b>GPU Frequency (MHz)</b>	500	600	650	500	575	612
<b>Texture processors</b>	48	56	64	48	64	64
<b>Render outputs (ROPs)</b>	20	16	16	20	24	24
<b>Stream processors</b>	96	112	128	96	128	128
<b>Stream processor frequency (MHz)</b>	1,200	1,500	1,625	1,200	1,350	1,500
<b>Shader Model support</b>	4	4	4	4	4	4
<b>DirectX support</b>	10	10	10	10	10	10
<b>Fabrication process (nm)</b>	90	65	65	90	90	90
<b>Transistors (million)</b>	681	754	754	681	681	681
<b>RAM</b>						
<b>Bus width (bits)</b>	320	256	256	320	384	384
<b>Effective frequency (MHz)</b>	1,600	1,800	1,940	1,600	1,800	2,160
<b>Bandwidth (GB/sec)</b>	64	57.6	62	64	86.4	103.7
<b>Quantity (MB)</b>	320	512	512	640	768	768
<b>Type</b>	GDDR3	GDDR3	GDDR3	GDDR3	GDDR3	GDDR3
<b>Interface</b>						
<b>Additional power requirements</b>	6-pin PCI-E	6-pin PCI-E	6-pin PCI-E	6-pin PCI-E	2 x 6-pin PCI-E	2 x 6-pin PCI-E
<b>CrossFire/SLI compatible (maximum number of cards)</b>	SLI (2 cards)	SLI (2 cards)	SLI (2 cards)	SLI (2 cards)	SLI (2 or 3 cards)	SLI (2 or 3 cards)
<b>PCI-E version</b>	1.1	2.0	2.0	1.1	1.1	1.1
<b>Number of slots, length</b>	Dual, 229mm	Single, 229mm	Dual, 229mm	Dual, 229mm	Dual, 266mm	Dual, 266mm

Nvidia GeForce 9600 GS0	Nvidia GeForce 9600 GT	Nvidia GeForce 9800 GT	Nvidia GeForce 9800 GTX	Nvidia GeForce 9800 GTX+	Nvidia GeForce 9800 GX2	Nvidia GeForce 260	Nvidia GeForce GTX 260 (rev2)	Nvidia GeForce GTX 280
\$150.00	\$160.00	\$200.00	\$285.00	\$290.00	\$620.00	\$440.00	\$450.00	\$690.00
550	650	600	675	738	600	576	576	602
48	32	56	64	64	2 x 64	80	80	80
12	16	16	16	16	2 x 16	28	28	32
96	64	112	128	128	2 x 128	192	216	240
1,375	1,625	1,500	1,688	1,836	1,500	1,242	1,242	1,296
4	4	4	4	4	4	4	4	4
10	10	10	10	10	10	10	10	10
65	65	65	65	55	65	65	65	65
754	505	754	754	754	1,508	1,400	1,400	1,400
192	256	256	256	256	2 x 256	448	448	512
1,600	1,800	1,800	2,200	2,200	2,000	1,998	1,998	2,214
38.4	57.6	57.6	70.4	70.4	2 x 64	112	112	141.7
384	512	512	512	512	2 x 512	896	896	1,000
GDDR3	GDDR3	GDDR3	GDDR3	GDDR3	GDDR3	GDDR3	GDDR3	GDDR3
6-pin PCI-E	6-pin PCI-E	6-pin PCI-E	2 x 6-pin PCI-E	2 x 6-pin PCI-E	6-pin PCI-E, 8-pin PCI-E	2 x 6-pin PCI-E	2 x 6-pin PCI-E	6-pin PCI-E, 8-pin PCI-E
SLI (2 cards)	SLI (2 cards)	SLI (2 cards)	SLI (2 or 3 cards)	SLI (2 or 3 cards)	SLI (2 cards)	SLI (2 or 3 cards)	SLI (2 or 3 cards)	SLI (2 or 3 cards)
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Single, 215mm	Single, 229mm	Single, 229mm	Dual, 229mm	Dual, 267mm	Dual, 267mm	Dual, 267mm	Dual, 267mm	Dual, 267mm

# How We Tested

For this Labs test, we grabbed branded graphics cards and decided to test generic examples of the GPUs on which these cards are based, at reference clock speeds. As the GPU and its accompanying RAM have the greatest effect on the performance of the graphics card, this meant that we were able to test more GPUs. We tested a whopping 27 in total, giving you a complete overview of the graphics card market.

For this month's Labs test, we've changed the games that we use to test graphics cards, the test settings and the PC in which the graphics cards are installed – as well as the way we measure out results – all the listed frame rates are from actual gameplay, measured by FRAPS. As such, you shouldn't compare any of the results from this Labs test with earlier articles in Atomic.

In this round up we've tested graphics cards by playing four games at three different quality settings. Obviously, we don't expect a low-end card to be able to handle high resolutions with plenty of AA and AF, so we judge each card based on what it's designed to do. Therefore, high-end cards are judged mainly on their ability to handle high resolutions, while mid-range cards are judged on how well they can run

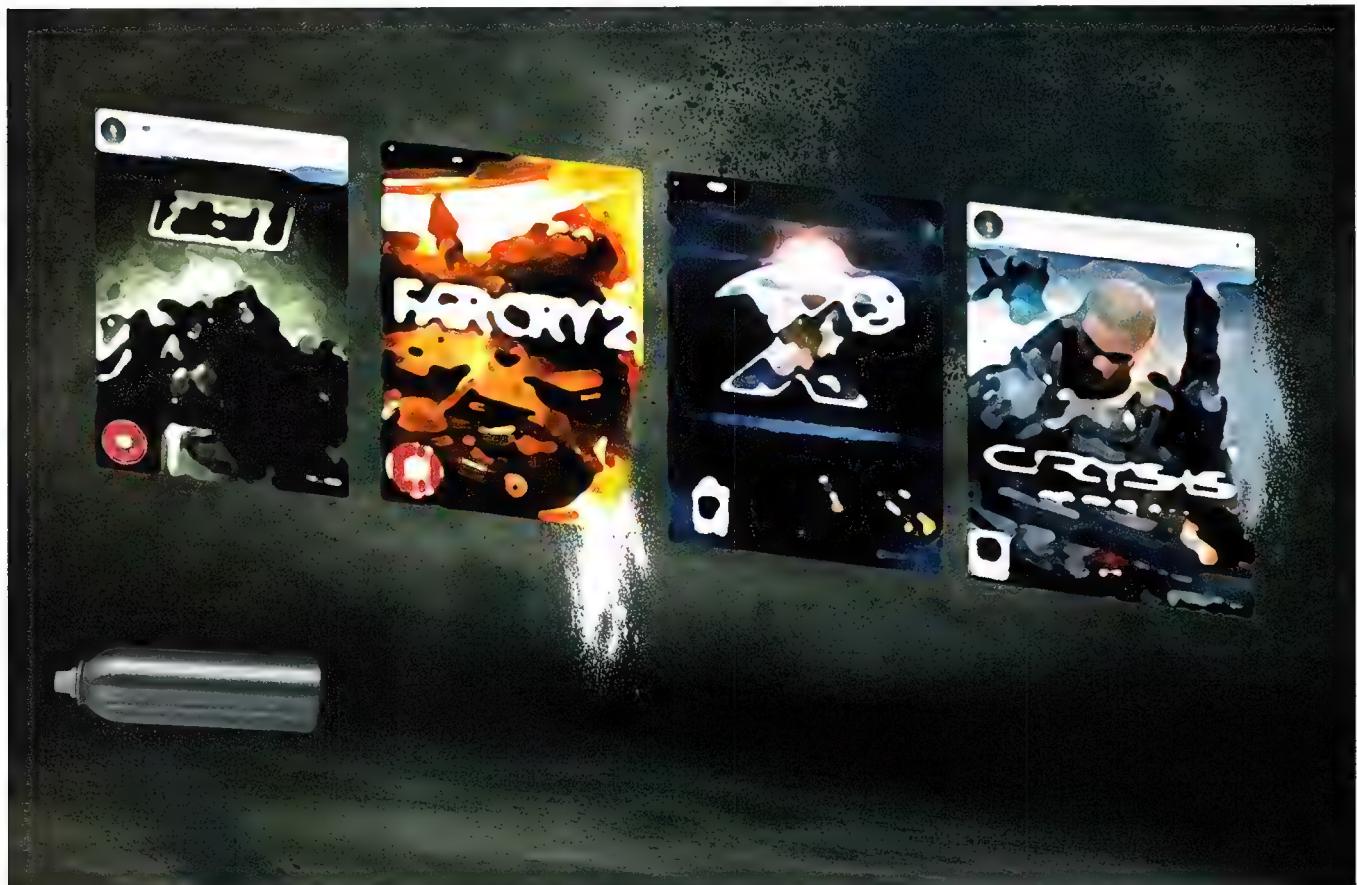
games at medium resolutions.

However, we expect all modern cards to be able to handle the latest shader-heavy games at maximum detail settings. This means that if a game supports both DirectX 9 and DirectX 10, we'll test in DirectX 10 mode. After all, what's the point in buying a new graphics card if it doesn't allow you to turn up the settings and enjoy the game in the way that the pants-wettingly detailed manner that the developer intended?

The four games we've used are Crysis Warhead, Far Cry 2, Fallout 3 and X3: Terran Conflict. In X3: Terran Conflict, we used the benchmark built into the game to record the minimum and average frames rates, and played the other three games. As we play each game, we measure the minimum and average frame rates using FRAPS ([www.fraps.com](http://www.fraps.com)). By looking at these figures, which are listed in the graphs starting at the end of the reviews, you can clearly see the resolutions and image quality settings at which each graphics card can run the games smoothly. The definition of 'smoothly' in this context is also important, as we consider both the minimum and the average frame rate. The reason for this is that,

since the eye perceives the lowest frame rate, a low minimum will mean that you see the game stutter and jerk, even if the average frame is high. For this reason, we define a game as being playable only if the minimum frame rate is 25fps or higher.

To ensure that the graphics cards weren't limited by the PC in which they were installed, we also updated our graphics card test rig for this lab. We used a 3.2GHz Core i7-965 Extreme Edition, accompanied by 6GB of Corsair TR3X6G1333C9 RAM and an MSI Eclipse motherboard based on the Intel X58 chipset. This system runs 64-bit Vista so that applications can take full advantage of all the system memory. To ensure that even the most power-hungry cards were provided with a stable supply of voltage and current, the test rig is fitted with the DXX version of the awesome 1kW Enermax Galaxy PSU. Where available, each card was tested with the latest WHQL-approved drivers. For all the NVIDIA GeForce GPUs, this meant using ForceWare 180.74, and Catalyst 8.11 on all the ATI Radeon GPUs, bar the HD 4830 and HD 4850 X2, which have their own special BETA drivers.



## ATI Radeon HD3850 and 3870

They weren't particularly appealing when released, are they now?

HD3850 \$110

HD3870 \$145

The ATI Radeon HD 3000-series architecture was based on the company's disastrous first attempt at a DirectX 10-compatible GPU, the HD 2900 XT. These two examples of the series are closely matched in specification, a fact that's reflected in the price.

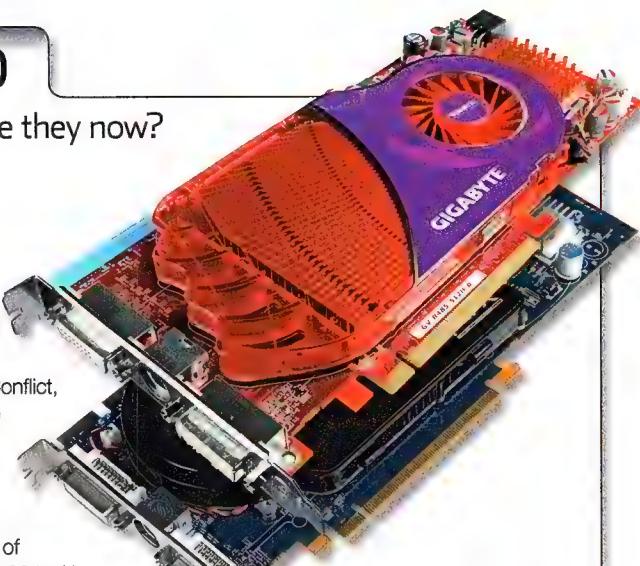
The 3870 boasts slightly faster clock speeds for the GPU core and memory than its sibling, with a 775MHz core and 512MB of GDDR4 memory at 1125MHz compared to the 3850's 668MHz core and 256MB of GDDR3 memory at 828MHz. The slightly faster clock speeds of the 3870 add up to a greater memory bandwidth of 72GB/sec, compared to the 53GB/sec of the HD 3850. Both GPUs are home to 320 stream processors and feature 256-bit memory buses. The 3850 has only half the memory compared to the 3870, running with the older GDDR3 instead of GDDR4.

These older cards are incapable of running

a game such as Crysis Warhead with maximum detail settings. However, both cards fared better in X3: Terran Conflict, achieving smooth playable frame rates at 1920x1200 with 4x AA and 8x AF. In both Far Cry 2 and Fallout 3, the extra power of the HD 3870 was enough for it claw its way into the realms of playable frame rates at 1,280 x 1,024 with 2x AA, leaving the HD 3850 skipping along merrily at less than 20fps in both games.

During gaming, the test rig sucked 248W from the wall with the HD 3870 installed, exactly 40W more than with the HD 3850.

A lot has happened in the year since ATI released these two GPUs - namely, the Radeon HD 4000-series. If you're after more performance or simply updated tech, you'd do very well to check the four series out. 



## ATI Radeon HD3870X2

Almost completely not the same as what we've seen before.

Price \$440



The HD 3870X2 was launched to a lot of fanfare in early 2008, but its wonky drivers meant that it produced very low minimum frame rates in many games, stuttering and struggling through. A couple of months later, performance was left wanting, and the drivers still left a lot to be desired.

Although the 3870X2 has now been superseded by the 4870X2 and 4850X2, physically it is one of the largest graphics

cards you can buy, measuring 266mm long. As its name suggests, two R680 cores have been slapped onto the board which run together in CrossFire mode. Each GPU has 320 stream processors running at 825MHz, and 512MB of GDDR4 clocked at 900MHz, with a 256-bit memory bus. Thanks to its two GPUs, the PCB has sockets for both 6- and 8-pin PCI-E power plugs.

Despite the twin GPUs, the 3870X2 produced very slow frame rates in Crysis Warhead, with a jerky minimum of 12fps at 1,280 x 1,024 with 2x AA. The card easily coped with X3: Terran Conflict, managing a smooth frame rate at 1,920 x 1,200 with 4x AA and 8x, and could play Fallout 3 and Far Cry 2 smoothly at 1,680 x 1,050 with varying amounts of AA and AF. Sadly when you stick two cores together like that, you draw a huge amount of power to achieve these frame rates - 337W of

it! The huge power draw means that it runs very hot, though the cooler dumps heat out of the back of the case.

Drivers meant that it was never a particularly reliable card, and although you can now pick one up for around \$440, it still isn't worth buying. The good news is that if you bought the card some time ago, you might still be able to score a cheap secondhand one and get yourself some Crossfirey action! 



## ATI Radeon HD4650 and 4670

Budget four series cards, worth a look?

4650 \$97

4670 \$119

While the ATI Radeon 3000-series GPU architecture shares many of the same features of the 2000-series, the 4000-series architecture was an almost entirely new departure, the lower end represented by these two cards.

Both of these 55nm GPUs feature 320 stream processors, with the 4670, running at 750MHz core speeds – considering the little price difference, the 4650 runs at a much slower 600MHz. The 4650 has twice as much memory than the faster 4670, with 1GB of GDDR2 compared to 512MB of GDDR3. Although the H4670 has a smaller quantity of memory, it's GDDR3 memory runs at 1000MHz, doubling the weaker card's clocks. Both GPUs support Shader Model 4.1 and DirectX 10.1.

The HD 4670 is capable of running X3: Terran Conflict at a playable frame rate of 26fps at 1,920 x 1,200 with 4x AA and 8x AF, an impressive feat for such a cheap graphics card.

However, the lesser HD 4650 failed to run the game smoothly at these settings. Similarly, in Far Cry 2 and Fallout 3, the HD 4670 managed playable frame rates, while the HD 4650 couldn't manage a playable frame rate in either game. Crysis Warhead upheld its reputation for ruthlessly snapping lesser cards in twain for daring run it, neither card managing so much as 15fps at the lowest test resolution.

These two graphics cards were only released in the last couple of months, so if you own one, you won't have had it for very long. The 4670 provides surprisingly good performance in modern games for a cheap card, but if you're after some extra performance then an upgrade definitely wouldn't go amiss. In contrast, ATI's latest addition to the family, the HD 4650, is one to avoid if you're looking for a new graphics card. 



4650  
Taint great, but will serve in a pinch.

4670  
Decent gaming performance, cheap.

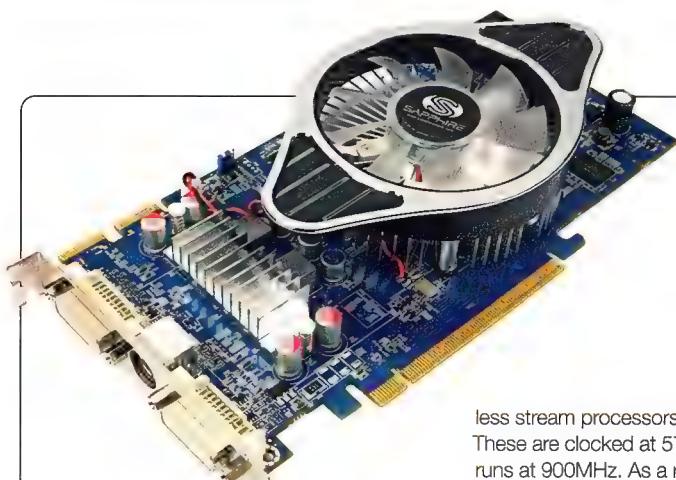
**Overall**  
This part of the 4-series is a mixed bag of performance.

73%  
80%

## ATI Radeon HD4830

Because we needed a filler in the series.

Price \$440



The HD 4830 is one of ATI's latest GPUs, and was designed to sit halfway between the mid-range 4850 and the bargain 46xx cards.

The HD 4830 is a cut-down version of the 4850, so it shares many of the same architectural features. For example, while both GPUs support Shader Model 4.1, DirectX 10.1 and GDDR3 RAM via a 256-bit memory controller, the HD 4830 has considerably

less stream processors – 640 compared to 800. These are clocked at 575MHz, while the RAM runs at 900MHz. As a result, the HD 4830 is slightly smaller and cheaper than the HD 4850, and draws less power, though it still needs a power connector.

Despite being based on ATI's third-generation DirectX 10 GPU architecture, the HD 4830 proved to be unable to play Crysis Warhead smoothly at any of our test settings. X3: Terran Conflict and Fallout 3 were a far easier challenge, and the HD 4830 played smoothly even at 1,920 x 1,200 with 4x AA and 8x AF. However, Far Cry 2's poorly lit African game world was more telling, and struggled to render smoothly. With the 4830 installed, our test rig drew 205W from the wall

when folding and 227W when gaming.

Although the 4830 isn't actually bad per se, it's very similarly priced to the fully-fledged HD 4850 so it's hard to see a reason for buying it. If you're limited to a budget on a graphics card, but have some wriggle room, the 512MB HD 4850, which only costs a little more, is a much better choice. 

**Overall**  
Spend the extra cash and get a 4850 instead.

73%

# ATI Radeon 512MB 4850 and 1GB 4850

Does memory help this core do more?

4850 512MB \$220 4850 1GB \$290

There's a lot of contention about whether more graphics memory makes a difference in games once you go beyond 512MB. It's a tricky question to answer exactly, as different configurations and different games will provide different results. As a rule of the thumb, however, more memory often proves to be beneficial when playing games at higher resolutions with lots of anti-aliasing.

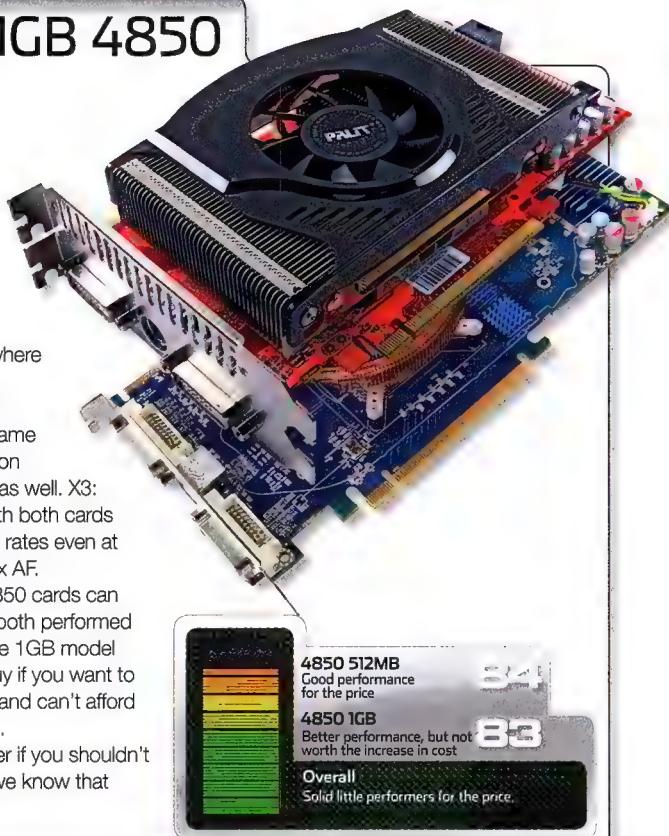
These two versions of ATI's Radeon HD 4850 have identical specifications in every aspect but the amount of memory they feature. Both cards have the core running at 625MHz, 800 stream processors and GDDR3 running at 993MHz. As the product names suggest, one card has 512MB of memory while the other has 1GB. Both GPUs support Shader Model 4.1 and DirectX 10.1.

Neither card was capable of playing the crippling Crysis Warhead at a smooth frame

rate, even at 1,280 x 1,080 with 2x AA. Both cards fared significantly better in Fallout 3, where they managed to run the game smoothly. In Far Cry 2, the 1GB HD 4850 managed to run the game smoothly, while the 512MB version managed a playable frame rate as well. X3: Terran Conflict was a breeze, with both cards delivering up very smooth frame rates even at 1,920 x 1,200 with 4x AA and 8x AF.

Although neither of the HD 4850 cards can play Crysis Warhead smoothly, both performed very well in the other games. The 1GB model in particular is a great card to buy if you want to play games at a high resolution and can't afford a more expensive graphics card.

Of course, you start to wonder if you shouldn't just spend a little extra again – we know that we would! 

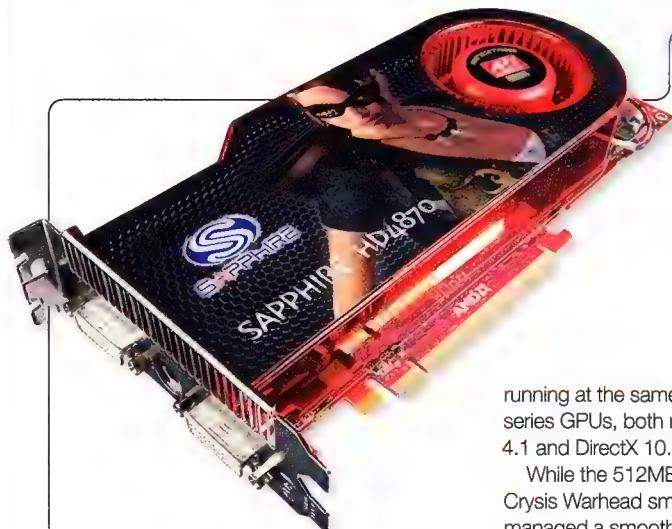


# ATI Radeon 512MB HD 4870 and 1GB HD 4870

Sheer, grunty power.

4870 \$350

4870 1GB \$405



The ATI Radeon HD4870 was the first card of the four series GPUs, and the first graphics card to topple NVIDIA off the hill for some time. In fact, we liked the card so much that it's retained a spot in Kitlog for several months.

Much like the 4850, these two 4870s have the same GPU, but have different memory configurations. Both models house a 55nm GPU running at 750MHz, with 800 stream processors inside. One version features 512MB of 1.8GHz (3.6GHz effective) GDDR5 memory while the other has 1GB of GDDR5

running at the same frequency. Like other 4000-series GPUs, both models support Shader Model 4.1 and DirectX 10.1.

While the 512MB 4870 struggled to run Crysis Warhead smoothly, the 1GB HD 4870 managed a smooth-ish frame rate of 27fps, giving a noticeably smoother experience. Neither card broke a sweat in X3: Terran Conflict or Fallout 3, producing smooth frame rates, even at 1,920 x 1,200 with 4x AA and 8x AF. The extra memory of the 1GB HD 4870 came into its own once more with the resolution turned up in Far Cry 2 – it pulled off a very playable frame rate quite easily.

When we previously looked at the difference between the 512MB and 1GB versions of the 4870, there was little worthwhile improvement from the extra memory. However, with new games and a new Core i7 test-rig built especially

for testing, the improvement in frame rates is more beneficial, especially in the demanding Crysis Warhead. Owners of these cards would do well to hold on to them for the foreseeable future, but if you're just desperate to spend some cash on a new graphics card, an 4870X2 is a great card to look at – you won't even need to change your driver over! 



# ATI Radeon HD 4850 X2 and HD 4870 X2

Sheer, grunty power – multiplied!

4850X2 \$490

4870X2 1GB \$739

While Nvidia continues to plough ahead, developing increasingly complex, power-hungry and hot-running monolithic cores, ATI's strategy for high-end graphics cards is to mount two slower cores on a single PCB. Although it was the first such dual-GPU card, the 3870X2 is hindered by absolutely terrible drivers, but the newly released HD 4850 X2 and HD 4870 X2 are much more impressive.

As their names suggest, the 4850X2 sports a pair of 4850 GPUs while the 4870X2 has a pair of 4870 GPUs. The two GPUs communicate with one another via a PCI-E bridge chip on the PCB, so neither card requires a CrossFire-compatible motherboard. The GPUs on each model are architecturally identical, each having 800 stream processors. However, on the 4850X2, each GPU runs at 625MHz, while the GPUs in the 4870X2 are clocked at a more impressive 750MHz. Each GPU communicates with its RAM via a 256-bit memory controller, but while each on-board GPU of the 4850X2 has access to 1GB of GDDR3 running at 993MHz (1.986GHz effective), each GPU on the 4870X2 has access to 1GB of GDDR5 clocked at 900MHz (3.6GHz effective). This means that the GPUs on a 4870X2 have incredibly increased memory bandwidth, with 115.2GB/sec compared to 63.6GB/sec.

Although ATI released the 4870X2 a few months ago, it wasn't until Catalyst 8.11 was released that they really got moving. ATI's latest driver appears to combine the power of the two GPUs very well across multiple games and resolutions, and as a result, the 4870X2 was the fastest graphics card money can buy. For example, it was the only card capable of playing Crysis Warhead smoothly at a decent framerate, with a minimum of 31fps and average of 40fps. In fact, it was only 1fps shy of playing the game smoothly at 1,920 x 1,200 with 4x AA - something that could be easily fixed with a little overclocking. The 4870X2 also made mincemeat of our other three test games, with an incredible minimum frame rate of 54fps in Far Cry 2 at 1,920 x 1,200 with 4x AA. In contrast, Nvidia's most powerful GPU, the GTX 280, is around 5fps slower in most games; this may not sound like much but it's enough to make some games jerky and unplayable.

However, to achieve this awesome performance, the 4870X2 draws a thoroughly incredible amount of power, increasing the



power draw of our test PC to 378W. This means that the 4870X2 produces a huge amount of waste heat, so it can be very difficult to keep cool.

The more recently released 4850X2 is slower than the 4870X2, thanks to its lower clock frequencies and smaller memory bandwidth. Even so, the HD 4850 X2 edged ahead of the similarly priced GTX 280 in every test. This means that the 4850X2 is capable of playing all our test games, bar Crysis Warhead, smoothly at 1,920 x 1,200 with varying levels of AA and AF. The 4850X2 is slightly less power-hungry than the 4870X2, but it still runs very hot.

In our selection of benchmarks, ATI's new dual-GPU cards take the performance crown from Nvidia in this comparison, the first time that an ATI card has done so for several years. As such,

the performance rankings show the 4870X2 in pole position, followed by the 4850X2 and then the GTX280. Quite what Nvidia can do about this, other than dropping the price of the GTX280 (again), or pushing the GTX285's out cheaper, we don't know. But at the moment, if you want the best gaming performance for the price then you should definitely consider picking up a 4870X2. (P)



## Nvidia GeForce 8800 GTS-series

Three cards from a bygone era.

320MB \$355 640MB \$485 512MB \$250

The original 640MB 8800 GTS was launched as a cheaper alternative to the now-classic 8800 GTX, and was later joined by a cut-down model that had just 320MB of memory.

Both original 8800 GTS cards had exactly the same G80 GPU, which has 96 stream processors running at 1200MHz, while the rest of the GPU is clocked at a more sedate 500MHz. Regardless of whether your 8800 GTS had 320MB or 640MB of GDDR3, the memory would have run at 800MHz and communicated with the GPU via a 320-bit memory controller.

While neither of the original 8800 GTS cards has aged as gracefully as the 8800 GTX, the 640MB 8800 GTS was able to play X3: Terran Conflict smoothly at 1,920 x 1,200 with 4x AA and 8x AF, and Fallout 3 at 1,680 x 1,050 with 2x AA and 4x AF. In contrast, the 320MB 8800 GTS has aged very badly, as the only game it could play smoothly was X3: Terran Conflict – showing just how important

it is to have plenty of memory in latest games.

Just over 13 months following the launch of the original 8800 GTS cards, Nvidia launched the 512MB 8800 GTS. However, this card had almost nothing in common with the original cards, as it was based on the more advanced G92 GPU. For example, its 128 stream processors were clocked at much higher though it only had a 256-bit memory controller. They did manage to bump up the RAM to an impressive 970MHz.

The superior specs of the 512MB 8800 GTS gave it an edge in our tests, however, the 512MB 8800 GTS still isn't powerful enough to play Crysis Warhead well.

Although all three 8800 GTS cards are competent cards, and worth keeping if your system is performing decently, none is capable of running DirectX 10 games smoothly. As such, it's definitely time to start thinking about an upgrade. 



### 8800GTS 320MB

This card is old, slow, and struggles with most tasks.

32

### 8800GTS 640MB

Faring slightly better, price is horrendously prohibitive.

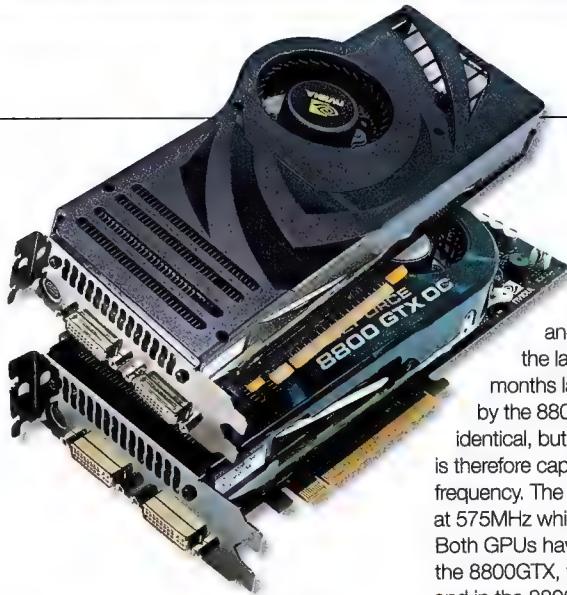
35

### 8800GTS 512MB

Cheap, and great performance in less demanding games.

76

**Overall**  
A mixed crowd, but with some good options.



## Nvidia GeForce 8800GTX and 8800 Ultra

These beastly cards still have it where it counts.

8800GTX \$500

8800 Ultra \$760

Although we were all impressed by the 8800GTX when it first launched in late 2006, nobody, including Nvidia, quite anticipated how long-lived this GPU would be. After all, the 8800GTX was the first unified-shader, DirectX 10 GPU, and first-generation products usually aren't very effective.

The 8800GTX is a hefty piece of engineering - it was the first graphics card to sport two 6-pin PCI-E power sockets,

and at 266mm long, it's still one of the largest cards on the market. Six months later, the 8800GTX was joined by the 8800 Ultra, which is architecturally identical, but has an improved cooler and is therefore capable of running at a higher frequency. The GPU core of the 8800 GTX runs at 575MHz while the 8800 Ultra runs at 612MHz. Both GPUs have 128 stream processors; in the 8800GTX, these are clocked at 1350MHz, and in the 8800 Ultra at 1500MHz. Both cards are fitted with 768MB of GDDR3 - an amount that was unheard of at the time - which communicates with the GPU through a 384-bit memory controller. The RAM on the 8800GTX is clocked at 900MHz, and 1080MHz on the 8800 Ultra.

Despite their age, these iconic cards were up to the challenge of playing most of our games smoothly at medium or high resolutions. X3: Terran Conflict and Fallout 3 were both playable

at 1,920 x 1,200 with 4x AA and 8x AF. Far Cry 2 was playable at 1,680 x 1,050 with 2x AA, while at 1,920 x 1,200 with 4x AA they were only a couple of fps shy of being playable. Neither card could render Crysis Warhead smoothly, but a little overclocking would make the game buttery smooth. They've both got an old-school 90nm manufacturing process, consuming a lot of power.

Although these are tricky to source, both are still fast. 8800GTX and 8800 Ultra - we salute you. 

### 8800GTX

Pricey and hard to find, but 1357 with a capital awesome

75

### 8800 Ultra

Very pricey for not much increase in performance

52

### Overall

Who knew they'd still be running strong?

# msi

## NOTEBOOK

MSI recommends Windows Vista® Home Premium



Windows Vista  
Home Premium

Some people just play games. Others live for them.  
If you like games, we think you'll love them on  
Windows Vista®. So get into the game.

### MSI new 15.4" HOT gaming series notebook



Stylish Brushed Aluminum Housing



Exclusive Turbo Drive Engine Technology



Exclusive ECO Engine Power Management System



Tom Clancy's Rainbow Six Vegas 2®  
2008 Ubisoft Entertainment  
(Optional)



Without 3D Graphics Display      With 3D Graphics Display  
NVIDIA GeForce 9600M GT 3D Graphic Card  
(Build-in 512 MB VRAM)



Dolby®-Certified Rich Audio Experience



Performance  
to go

[www.msi.computer.com.au](http://www.msi.computer.com.au)

**NSW** Capitol Computer: 02 9281 8890  
Online Centre: 02 9211 0898  
PC Market: 02 9898 3055  
Pluscrop: 02 9281 3858

**SA** Adelaide Online Computers: 08 8363 4744  
A & R Computers: 08 8351 1200  
Paramount Computers: 08 8354 2525  
Leader Computers: 08 8112 6000

**QLD** Game Dude Computers: 07 3387 1500  
Umart Online: 07 3369 3928

**VIC** Computer & Parts Land: 03 8542 8688  
Centre Com: 1300 007 600  
Scorpion Technology: 1300 726 770

**WA** Austin Computers: 08 9201 2788  
Netplus Micro Computers: 08 9242 7288  
DMA: 08 9204 7000

**MSI GX620 powered by Intel® Centrino® 2 processor Technology**

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## Nvidia GeForce 9800GT and 512MB 8800GT

They think they can... but they can't.

8800GT \$180

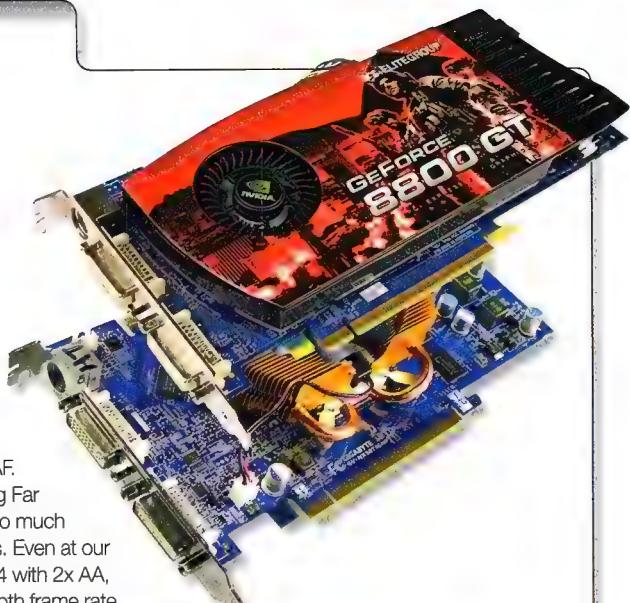
9800GT \$175

While some people might be wondering why these two cards from apparently different series have been paired up for review, some readers will be more familiar with Nvidia's befuddling, bewildering and discombobulating naming shenanigans of late. The GPUs used in these cards have only one difference in that the 9800 GT has a tiny chip that enables a pretty useless feature known as Hybrid Power that's only compatible with a handful of undesirable motherboard chipsets with integrated graphics.

The 9800 GT and 8800 GT are based around a GPU manufactured on a 65nm process (the former on 55nm), which runs at 600MHz. The cards feature 112 stream processors clocked at 1500MHz and 512MB of GDDR3 memory running at 900MHz. Both cards support Shader Model 4 and DirectX 10.

It was no surprise that the cards scored identical frame rates when playing games. Both cards ran X3: Terran Conflict and Fallout 3 smoothly at 1,920 x 1,200 with 4x AA and 8x AF. Unfortunately, the more demanding Far Cry 2 and Crysis Warhead were too much for these identity-challenged GPUs. Even at our lowest test setting of 1,280 x 1,024 with 2x AA, the GPUs failed to produce a smooth frame rate in either game.

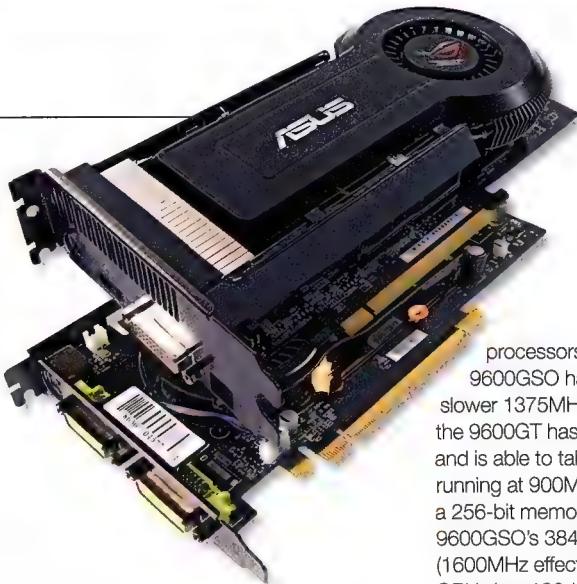
The gaming results speak for themselves. Far Cry 2 and Crysis Warhead will be on most gamers' must-play list, so if you have one of these cards, you'll have to start sacrificing detail settings. For this reason, an upgrade is recommended, but if you're enjoying the games otherwise – go for your life! ☺



8800GT  
Okay for the price, though not the best

9800GT  
Even more okay, for \$5 less

Overall  
Not ideal, but still competent with older titles.



As Nvidia appears to have a bad case of 'name diarrhoea' right now, and is conjuring up new names for old cards on an almost daily basis, we aren't sure how long the 9600GSO will be around. To add to the pain of understanding what to buy, its specs are completely mixed up, with some being superior to the more expensive 9600GT, while others are inferior.

Whereas the 9600GT has 64 stream

processors running at 1625MHz, the 9600GSO has 96, although they run at a slower 1375MHz. To confuse matters further, the 9600GT has a superior memory subsystem, and is able to talk to its 512MB of GDDR3 running at 900MHz (1800GHz effective) via a 256-bit memory controller. In contrast, the 9600GSO's 384MB of GDDR3 runs at 800MHz (1600MHz effective) and communicates with the GPU via a 192-bit memory controller.

This eclectic mixture of specifications makes it very hard to predict the performance of the two 9600 GPUs. For example, while the 9600GSO was swamped by Crysis Warhead, the 9600GT was much faster, although the game still wasn't playable. At the same time, although both models coped admirably with X3: Terran Conflict and Fallout 3, neither could play Far Cry 2 smoothly.

The 9600GSO is outclassed by the similarly

## Nvidia GeForce 9600GSO and 9600GT

NVIDIA picks another great name.

9600GT \$135

9600GSO \$120

priced HD 4670 for gaming performance. However while the latter is currently limited to gaming only, the 9600GSO, thanks to CUDA, is capable of many more types of calculation. For example, the 9600GSO is a speed demon when it comes to Folding@home and as such, if you want to use your PC for more than gaming, or are planning on building a folding farm with multiple graphics cards, the 9600GSO should be at the top of your shopping list. ☺

9600GT  
Worth the extra \$15 for performance.

9600GSO  
Good for CUDA, but otherwise grab the GT.

Overall  
A real mix of specs, and performance.



## Nvidia GeForce 9800 GTX and 9800 GTX+

I think I'm a clone now....

9800GTX \$285

9800GTX+ \$259

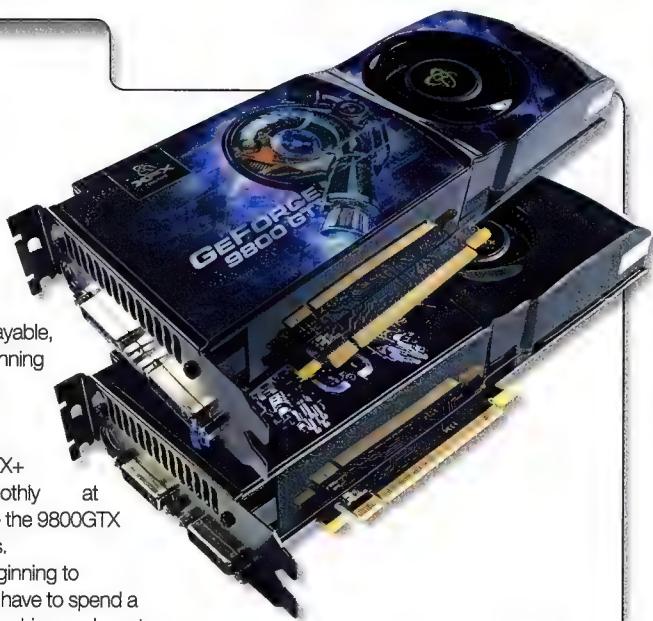
The Nvidia GeForce 9800GTX+ is another addition to the bafflement caused by Nvidia's haphazard product naming policy. The 9800GTX is essentially an 8800GT with more stream processors and higher clock frequencies. Not content with this upgrade, a new revision was released in the form of the 9800GTX+, which featured a further die-shrink and an additional increase in clock frequencies – at the cost of a heightened TDP to 145W, five watts increase.

The 9800GTX core runs at 675MHz, whereas the 9800GTX+ saw an increase to 738MHz. The frequency of the 128 stream processors also increased from 1688MHz to 1836MHz, while the 512MB of GDDR3 memory stayed the same at 1100MHz on a 256-bit memory bus. Both cards support Shader Model 4 and DirectX 10.

There isn't a huge performance difference between the two models in many games.

However, despite the 9800GTX+ having the edge, neither card could run Crysis Warhead smoothly. Fallout 3 and X3: Terran Conflict were playable, with both models capable of running them smoothly at the standard settings. The biggest difference between the two cards was in Far Cry 2, in which the 9800GTX+ was able to play the game smoothly at 1,680 x 1,050 with 2x AA, while the 9800GTX could only manage a slower fps.

Although the 9800GTX is beginning to struggle in some games, you'd have to spend a significant amount of money to achieve a decent performance boost. In contrast, the faster and more energy-efficient 9800GTX+ is up to the challenge of playing most games, bar Crysis Warhead, at 1,680 x 1,050, which is the native resolution of a 20/22in widescreen TFT. Given that it retails for roughly \$1 less than the 512MB 4850, it's a worthwhile upgrade from an entry-level or older graphics card. (E)



It took Nvidia a while to release another dual-GPU graphics card after the awesome 7950GX2, the fastest DirectX 9 graphics card ever produced. Despite its confusing 9-series name, the 9800GX2 comprises two G92 GPUs, the same as used in 512MB 8800GTS

Unlike the 7950GX2, the GPUs on the 9800GX2 are positioned on separate PCBs facing each other, and are encased in a square black plastic shroud. As a result, the 9800GX2 looks far less distinguished than

earlier high-end graphics cards. Each GPU has 128 stream processors clocked at 1500MHz, while the core runs at 600MHz, and is accompanied by 512MB of GDDR3 speeding along at 1GHz on a 256-bit memory bus. The two GPUs communicate with one another via a PCI-E bridge chip on the PCB, so the 9800GX2 doesn't require an SLI-compatible motherboard, unless you're insane and plan on using two cards in Quad SLI, in which case we adore you.

The performance of any dual-GPU graphics card depends on up-to-date drivers and multi-GPU-friendly games. The 9800GX2 currently does a good job of running three of our test games, X3: Terran Conflict, Fallout 3 and Far Cry 2; it can play all but the latter game smoothly. Far Cry 2 was playable at 1,680 x 1,050 with 2x AA, but Crysis Warhead proved to be too much for the 9800GX2, even at 1,280 x 1,024 with 2x AA,

## Nvidia GeForce 9800 GX2

GPU times two.

9800GX2 \$620

managing to squeeze out 31fps.

If you're lucky enough to own a 9800GX2, we'd recommend holding onto it for now, as the only card in this roundup that's fast enough to justify its price difference is the hot-running 4870X2. Even then, it's hard to justify spending around \$739 to be able to play Crysis Warhead smoothly at higher resolutions. (E)



# Nvidia GeForce GTX 200-series

The start of Nvidia's latest dynasty.

280 \$690 260 \$440 260+ \$450

With the joys of the Internet and next-day delivery, buying a new graphics card is now easy. In contrast, selecting the right graphics card to buy can be a daunting prospect. This is especially true of Nvidia GPUs, as the naming scheme is about as comprehensible as reading Steven Hawkins's 'A Brief History of Time' in a foreign language with a massive hangover. In the dark.

At the time the GTX 200-series was released, Nvidia had received so little competition from ATI for so long that prices were sky high. Unless you won the lotto, or married a Texan oil magnate, buying a card would cause a serious dent in your bank balance. However, the release of the awesome 4870 saw Nvidia drop the price of the GTX280 faster than pants on a hot day.

Nvidia later released a second version of the GTX260 with 216, rather than 192 stream processors, but for some inexplicable reason decided not to give it a new name. To avoid confusion, we decided to call it the GTX260(rev2) from now on. It isn't only ourselves who are confused; one of the review samples of the rev2 cards we received had stickers over the labels to denote the new revision. Much to our amusement, the tech specs on the box weren't covered with a sticker, so they still read 'unleash the power of 192 stream processors'. Brilliant.

Stream processors aside, the GTX260 cards are based around a 576MHz GPU based on a 65nm process; this is technically a step backwards from the previous 9800GTX+ GPU, which was made using a 55nm process. Both GTX260s sport 896MB of GDDR3 clocked at 999MHz and stream processors clocked 1242MHz. A 448-bit-wide memory interface contributes to a memory bandwidth of 112GB/sec. The GTX280 boasts faster clocks in almost every part of its anatomy; the GPU runs at 600MHz, with its 240 stream processors clocked fractionally higher than the GTX260 at 1296MHz, and the 1GB of GDDR3 memory runs at 110MHz. The GTX280's wider 512-bit memory bus helps to provide 141.7GB/sec of memory bandwidth.

Of the three cards, the GTX280 was the only one able to run Crysis Warhead smoothly with all the settings maxed out, although it was at our lowest test resolution - 1,280 x 1,024 with 2x AA. With some of the sub-£100 cards managing to run X3: Terran Conflict and Fallout 3 smoothly at 1,920 x 1,200 with 4x AA and 8x AF, it wasn't surprising that all



three of these cards made mincemeat pies out of these relatively undemanding modern games. Far Cry 2 is a little more demanding, but all three cards managed to play the game smoothly at 1680 x 1050. It should be mentioned, however, that the GTX260(rev2) managed a 38fps minimum compared with the older model's 28fps - this extra performance may be useful when there's a lot of action is taking place on-screen.

Under full gaming load, and armed with a standard GTX260, our Core i7 test rig drew 272W from the wall. Swapping it for the GTX260 (rev2) raised the figure to 281W. The GTX280 was significantly more power-hungry, with the system munching its way through 389W when gaming.

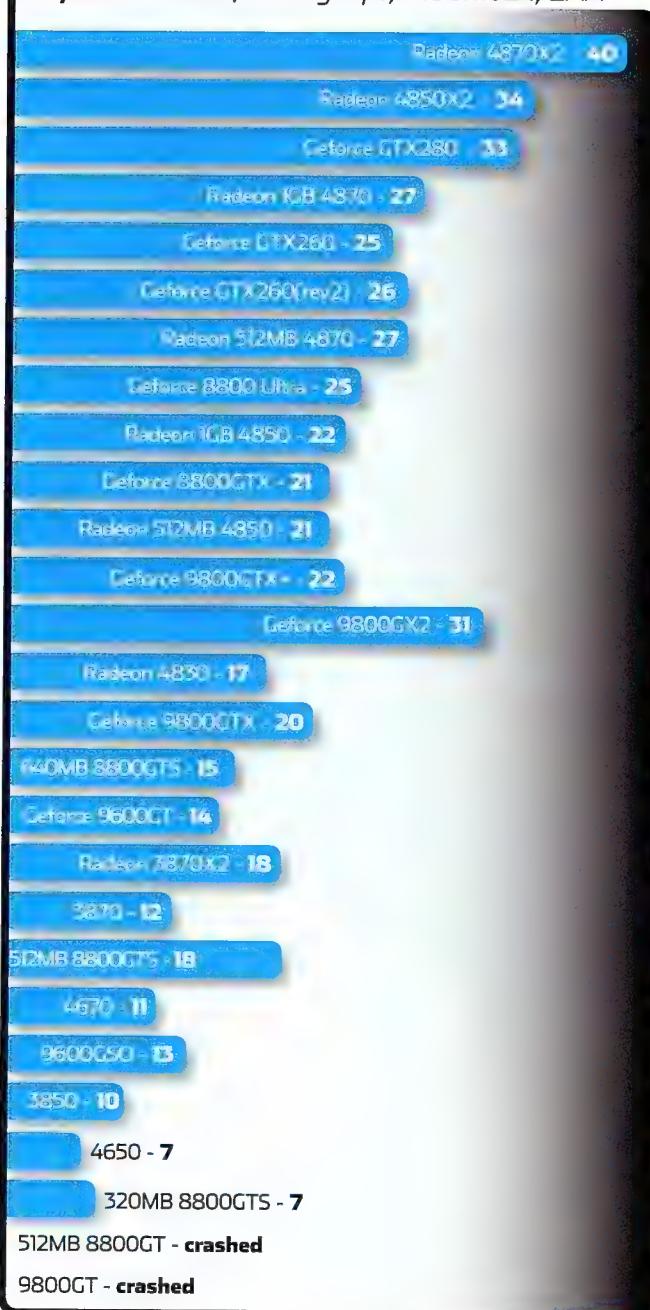
The GTX260 cards always struggled with playing Crysis in a Core 2 system, and the same can now be said of Crysis Warhead in a Core i7 system. The GTX260(rev2) added more to

our confusion than it did to the frame rates of our test games. However, although the 4870X2 is significantly faster than all GTX 200-series GPUs, we don't think it's worth upgrading to this card; instead, we'd recommend holding off upgrading until DirectX 11 parts hit the shelves in mid-2009.



## Benchmark results

**Crysis Warhead, Average fps, 1280x1024, 2AA**



**Fallout 3, Average fps, 1280x1024, 2xAA, 2xAF**



## What to buy

With so many test results to consider, we've compiled a handy guide to which graphics card is best for you

### You have a 320MB, 512MB or 640MB 8800 GTS, 512MB HD 4850 or HD 3870 X2

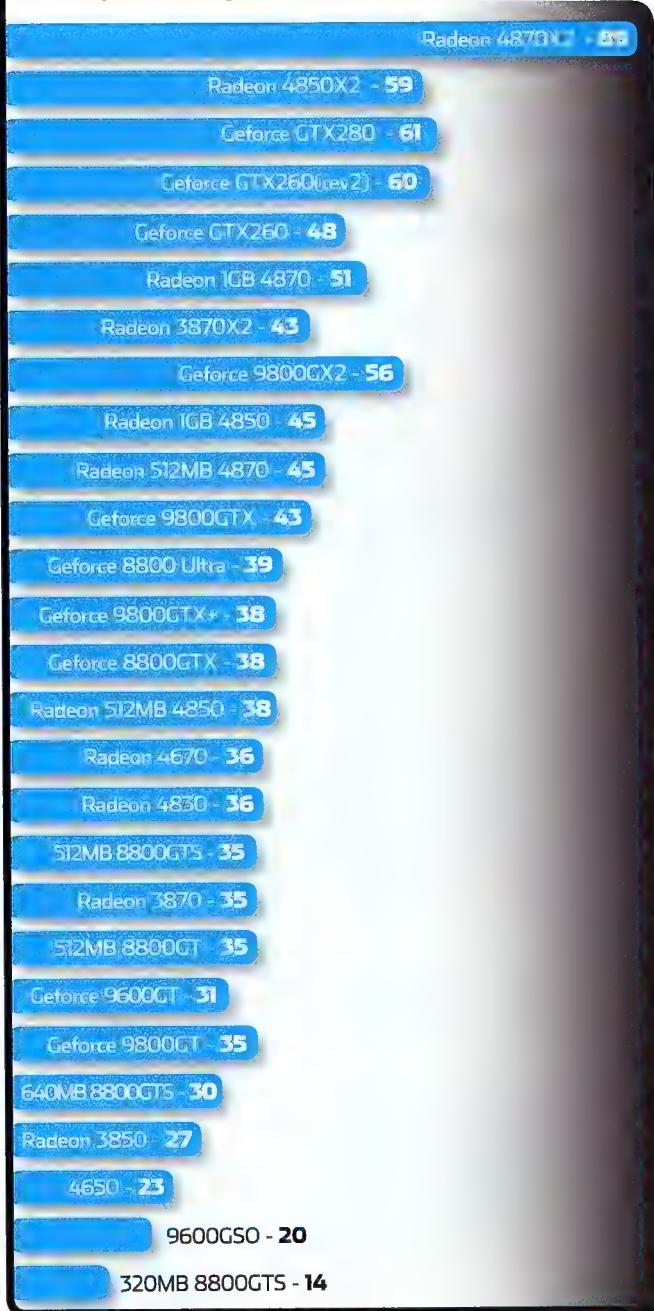
All these cards struggle to play DirectX 10 games smoothly, so it's definitely worth saving up for an upgrade.

Of these cards, only the 320MB 8800 GTS is particularly bad, and you'll need to spend a reasonable amount of money to obtain a worthwhile upgrade. If you only care about gaming, the 1GB HD 4870 is a great choice, as it's fast enough to play all modern games

at maximum detail. Alternatively, you may wish to consider the GTX 260 (rev2), which is slightly slower than the 1GB HD 4870 in Crysis Warhead, but a little faster in Far Cry 2.

### You have a 512MB 8800 GT, 9600 GSO, 9600 GT, 9800 GT, HD 3850 or HD 3870

Although these cards can play some modern games smoothly, they struggle with DirectX 10 games and high detail settings.

**Far Cry 2, Average fps, 1280x1024, 2xAA****X3: Terran Conflict, Avg fps, 1280x1024, 2xAA, 2xAF****Spending up to \$300**

The 9800 GTX+ is great value for money. It's capable of playing most games at medium resolutions (1,680 x 1,050), so it's an ideal choice for a PC with a 20/22in widescreen TFT. Although it isn't quite as fast as the 1GB HD 4850 at high resolutions, it's a good deal cheaper.

**Spending up to \$400**

If you're only intending to play games on your PC and can afford more to spend more than

\$300, the best upgrade from one of these cards would be a 1GB HD 4850. This card is capable of playing all our test games smoothly at high resolutions, bar Crysis Warhead.

**You have an 8800 GTX, 8800 Ultra, 9800 GTX or 9800 GX2**

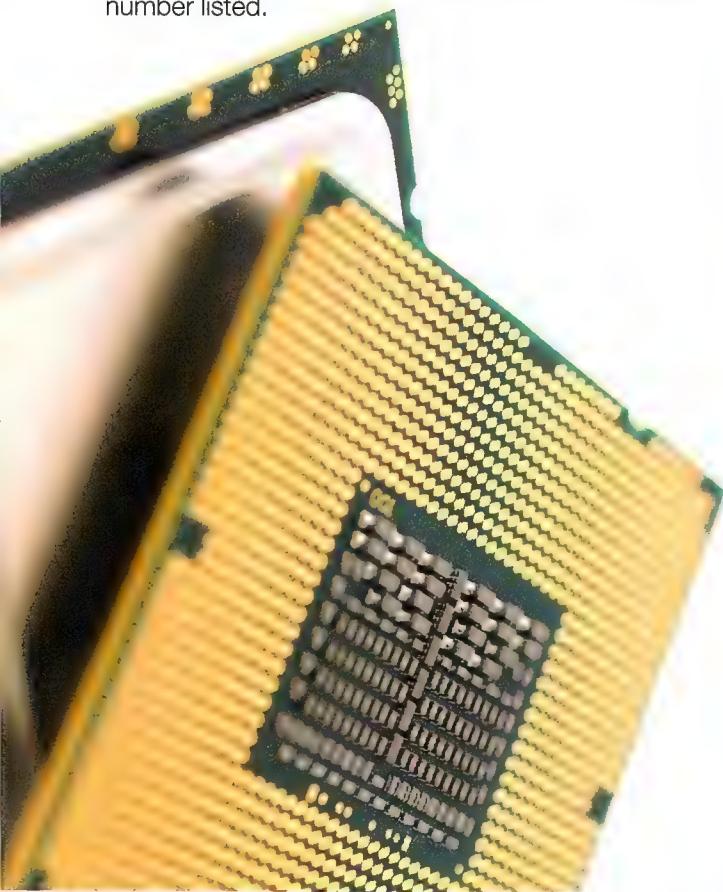
The good news is that your current card can still cope with almost anything you can throw at it, but the bad news is that you need to spend a serious amount of cash to gain a worthwhile performance increase.

**I just want the best**

If you really can't wait until ATI and Nvidia release its next-generation DirectX 11 GPUs sometime around mid-2009, the only card worth buying now is the ATI Radeon HD 4870 X2. However, this card consumes a huge amount of power, runs extremely hot and requires regular driver updates to ensure that both GPUs work well together.

# KITLOG

There's nothing sexier than new kit. And whether you need to horde your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and a collection of sports cars (Extreme), we're here to help with this handy matrix of Atomic recommended products. You may find your needs fall between categories – that's okay, just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in Atomic, so if you want to learn more, look up the issue and page number listed.





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## BUDGET



### AMD Phenom X4 9550

PRICE \$170-180

A well performing Quad core for those on a budget, that won't break the bank and doesn't get too hot.



### BIOSTAR TA790GX A2+

PRICE \$150

A great overclocker with fast integrated graphics – you don't even need to buy a graphics card with this one!

*Reviewed in Issue 93 – Page 34*

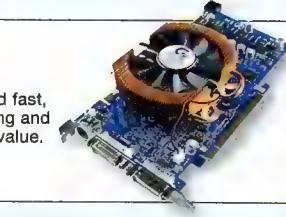


### TEAM Xtreem Dark PC2-6400 C4

PRICE \$60

These modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.

*Reviewed in Issue 80 – Page 56*

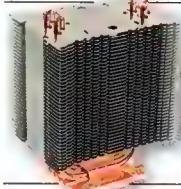


### GeForce 9800GT 512mb

PRICE \$150-160

A 55nm card that remains very cool and fast, with plenty of headroom for overclocking and a price that speaks volumes about it's value. Great performance too.

*Reviewed in Issue 92 – Page 49*



### Noctua NH-U9B

PRICE \$72

Labs tested to be the top of the cooling game without breaking the bank (or making you sweat – haha)

*Reviewed in Issue 89 – Page 36*



### 640GB HDD

PRICE \$90

The absolute best value for money, with two 320GB platters giving great speed and low latency.



### AOC 2216Vw

PRICE \$240

A great 22" widescreen for any purpose, with accurate colour reproduction and a bloody good price.

*Reviewed in Issue 94 – Page 42*



### SteelSound 5Hv2

PRICE \$120

Great gaming headphones with inbuilt mic, but music quality falls short.

*Reviewed in Issue 73 – Page 43*



### Cooler Master CM690

PRICE \$100

A sturdy, spacious case with plenty of airflow and more than enough room for the biggest of systems. Some stores even have a windowed version!

*Reviewed in Issue 84 – Page 51*

## PERFORMANCE



### Intel Core 2 Duo E8400

PRICE \$190

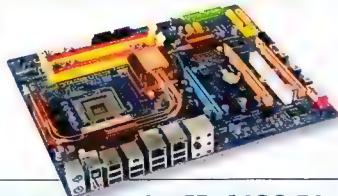
A processing powerhouse, now affordable and overclockable like buggery.

### GIGABYTE EP45-DS4P

PRICE \$195

A P45-based mobo with a bevy of features and a good overclocking potential.

*Reviewed in Issue 93 - Page 55*

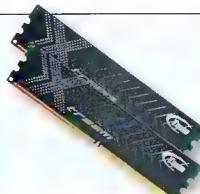


### TEAM Xtreem Dark PC2-6400 C4

PRICE \$60

Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits.

*Reviewed in Issue 80 - Page 56*



### Sapphire HD4870

PRICE \$319

One of the best price to performance cards on the market. Welcome back Red!

*Reviewed in Issue 92 - Page 36*



### Thermalright Ultra 120 Extreme

PRICE \$65

Tower cooling that will keep your tower cool. Whack a Nexus 120mm fan on for near silent cooling.

*Reviewed in Issue 89 - Page 33*



### 640GB HDD - Times two!

PRICE \$90x2

All the speed of dense platters, with the peace of mind to be able to back up your precious files.



### NVIDIA GTC295x2

PRICE \$860 x2

NVIDIA catapulted themselves back to the top with this dual-GPU sandwich. Grab two of them in SLI for four-way madness!

*Reviewed in Issue 98 - page 41*



### Thermalright Ultra 120 Extreme

PRICE \$65

The current best air cooling - just make sure you grab a LGA1366 mounting kit to use it!

*Reviewed in Issue 89 - Page 33*



### Intel 80GB SSD

PRICE \$939

Blindingly fast, effortlessly quick, and utterly silent. Grab a normal HDD for storage, but games and OS need to live here.

*Reviewed in Issue 94 - Page 50*



### LG W2252TQ

PRICE \$270

You'll pay a little more for this 22" screen, but the colours are amazing, with no backlight bleed and no ghosting.

*Reviewed in Issue 94*



### Dell 3008 WFP

PRICE \$2199

It's enough to make a grown man weep and beg. Or, at least, that's what we'd do for one of these simply gorgeous displays.

*Reviewed in Issue 88 - Page 59*



### AVLabs AVL325

PRICE \$210

Slightly aged speakers now, but these still offer a great 5.1 sound experience - if you can find a set.

*Reviewed in Issue 64 - Page 50*

### Logitech Z-5500D

PRICE \$319

Able to play the 'liquid gold' that is DTS 96KHz/24-bit, this 5.1 beast can wreck both home and hearing alike.

*Reviewed in Issue 48 - Page 56*



### Cooler Master HAF 932

PRICE \$180

A massive case with three 230mm fans that can move enough air to qualify as a small aeroplane. And quiet to boot.

*Reviewed in Issue 93 - Page 48*



### Lian Li X-2000

PRICE \$575

The only case we've had in that has made the editor orgasmically happy, and is drenched with quality in every one of its brushed aluminium panels. Definitely a case to show off your system-building prowess!

*Reviewed in Issue 91 - Page 54*



**Daniel Rutter looks back to look forward.**

**C**omputers are pretty easy to use these days, right?

I mean, there've been umpteen user-interface revolutions and revisions since the dawn of the personal computer age, almost all of them obviously improvements.

Mac OS, at the very least, makes a computer as easy to use as you could reasonably expect, right?

You hardly ever need to crank a handle to start your car any more! And tyres only blow out about once every 200 miles! What more could you possibly want?

Fortunately, I've got a better metaphor for

the computer-game scene in 1970.

There was a much bigger reason why people didn't read for pleasure back then, though. Because of the way people wrote back then, reading was really bloody difficult.

It was quite possible – common, even – for early European-language writing to have nospacesbetweenthewords, and no vowels in th wrds. Plus, if you were really lucky, shorthand symbols as well.

This was because the only material you could make a book out of was parchment, and parchment was expensive. So the more text you could pack into a small area, the better.

person' is probably neither another family member nor a Russian hacker. But stuff like this jams itself into the face of ordinary users all the time, breaking their concentration and demoralising them. It's like trying to read a book THTLKSLKTHS.

Dozens of confusingly-named models of video card. Hard drives that die with no warning. The thousand and one bizarre symptoms a bad PSU can cause. Pop-up ads that offer to install an anti-virus program, and then install a virus. The list goes on and on.

It's now a heck of a lot easier to use a computer than it was 25 years ago. You can do a heck of a lot more with it, too.

But just you wait until computer technology makes it to the Renaissance. ☺

**In this respect, I think you can make a case that computer technology has made it to the late sixth century, at best.**

the current state of computer usability than the car one, which has been the Lazy IT Writer's Friend since a 'home computer' took up a large room and quintupled your power bill.

Let's, instead, consider that weird old phrase 'computer literacy', these days seldom used except by people teaching Windows to the elderly. Let's compare computer literacy with ordinary literacy. Reading and writing.

In this respect, I think you can make a case that computer technology has made it to the late sixth century AD, at best.

In the olden days, you see, the upper classes were able to read and write, but they generally preferred not to. They left it to people who had to do it, like scribes and clergymen.

There were two reasons why people didn't read for pleasure back then.

One was that there simply wasn't a lot of stuff to read for pleasure. Before the printing press, before even affordable paper, stuff to read for fun was pretty thin on the ground. Plays, scholarly works, epic poetry. It was like

Leaving out spaces and vowels helped with this, as did various schools of shorthand.

If you wrote modern English this way, then even without shorthand, 'hello world' would compress into 'HLLWRLD' (lower-case hadn't been invented yet, either). The reader would then have to figure out from context what it was actually meant to mean.

'Hollow railed'? 'Hill war led'? 'Halal ower lode'?

Okay, that last one's pushing it. But you get the idea.

Decoding this 'compressed' text was no fun at all. So rich folk preferred to pay someone to read to them.

Today, of course, few people have staff who take care of their computers. But if they could have an in-house computer expert, the average user probably would very much like one.

All of us experts may know that the computer won't call the cops about an 'illegal operation', and that if a file 'is being used by another person or program' then the 'other

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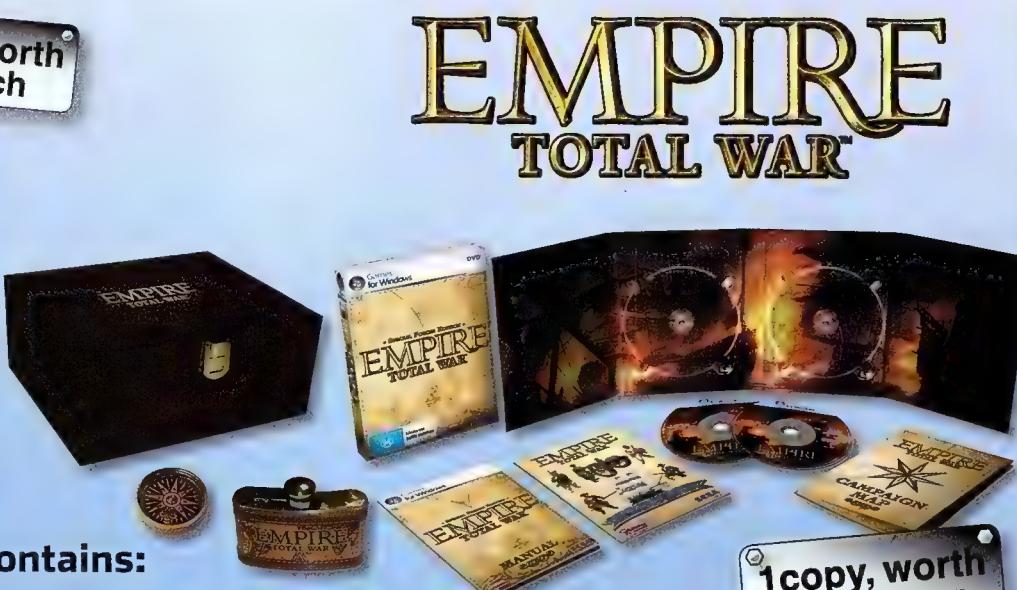
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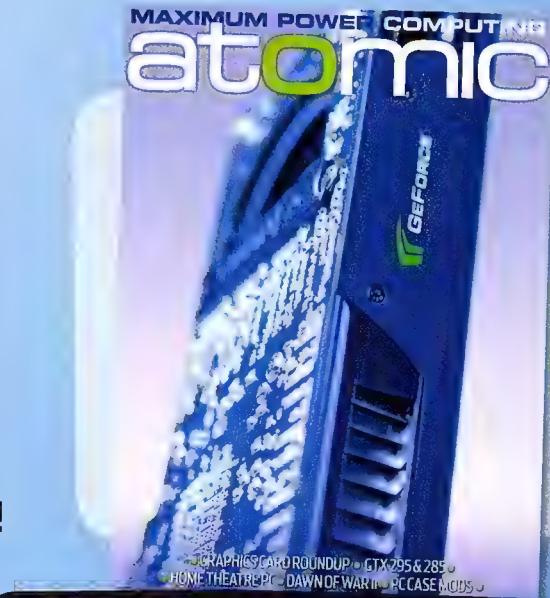


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# TUTORIAL

## HANDS-ON TUTORIALS FOR THE TECHNICALLY MINDED

**L**earning.

We have it.

This month's tute section gets both old school and new school – and a few surprising things in between!

First up is a DIY look at building your own Home Theatre PC. Our tame AV nut has recently upgraded her home entertainment setup, and she's sharing her work with you. From choosing parts, to the initial hardware tweaking (she's doing obscene things to wireless keyboards), this is the first part of a great couple of articles.



Ron's back, too, this time illuminating the topic of PC case lighting. He's got some great tips on installing all manner of shiny things, and ways to make them shine even brighter. If you've got a windowed case to show off your cool tech, adding lights is the best way to make your build even smarter.

Atomic.edu continues our round-up of universities around Australia, and then Zara Baxter, geek girl extraordinaire, explores the correlations between gaming and sexuality in a column you could only ever find in the pages of Atomic.

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# DIY Home Theatre PC, pt1

AV geek extraordinaire, **Jaye Gallagher**, walks us through the ultimate HTPC build.

Sometimes life smiles on us, and when that smile came to me in the form of a whopping great refund cheque from our friends and overlords at the Australian Taxation Office, I decided that it was time to do what any self-respecting geek would have done a long time ago: upgrade the AV gear in the lounge room. I'd been persuaded a few months ago that the latest generation of LCD televisions really do cut the mustard when compared with my aging CRT, and I'd had the same amplifier for the last 20 years (I'd made some... special modifications). So they were both on the upgrade list, but what about being able to watch the eyeball-popping new HD video formats? And play the psychedelic-techno-maelstrom games I favour on the massive new telly? Clearly a new home theatre PC was in order.

## The Spec

So, what, exactly do we want from the new toy? The new amplifier allows video source switching on HDMI, so the video card has to have HDMI output. Both Blu-Ray and HD-DVD playback are a must – HD-DVDs can be had pretty cheaply in the ashes of the format war. Since we're upgrading the amplifier, we also want to be able to use the fancy, high-quality audio available on high definition discs, and hear the difference. I'll be ripping all of my CDs onto a storage backend of some sort, so good

audio quality will be important there too. The machine has to run as close to silent as possible, have enough grunt to play reasonably modern games like World of Warcraft and Geometry Wars: Retro Evolved (modern huh? Rrrright-ed) respectfully, and look good enough to sit on the shelf next to the rest of my gear, too. And we'll be wanting a wireless keyboard that actually works in an inner city lounge room.

## The Plan: Hardware

When building a new PC you should always be prepared to spend a few extra dollars to get a system that's easier to put together, more likely to work without hassles, and going to stay working in the long term. We've spent too much time in the past tearing hair over weird driver quirks and poor interactions between gear from different and obscure vendors: life is too short. Given that the core of any HTPC design are the video and audio output, we had a casual poke around a few of the available options and discovered that finding a sound card that would do high-definition audio output over HDMI was the limiting factor: the ASUS Xonar HDAV (reviewed issue 96, and here <http://www.atomicmpc.com.au/?135112>) looked like the best option. I've had good experiences with ASUS in the past – my laptop is now in its sixth year of smooth running – so, to take advantage of the in-house system testing

that ASUS will inevitably have done, and not seeing much price differential between brands, I decided the core of the box was going to be ASUS gear. Here's exactly what I settled on, and why:

### **Motherboard: ASUS P5K SE/EPU**

The P5K SE/EPU is a fairly standard, middle of the road Intel LGA775 motherboard in an ATX form factor. I figured that having more room to separate the various cards in the system would make for easier, and thus quieter, cooling of the system and so went with an ATX board. The SE/EPU got good reviews around the online traps, and I didn't find any reports of serious problems with the board. Spec-wise it's got everything we'll be needing: two 16x PCIe slots and two 1x slots, onboard gigabit Ethernet, and a good number of SATA connectors. It's also well placed for future upgrades if we need more grunt from the system down the road – 1600MHz front side bus, eSATA, and quad-core-compatibility, in particular.

### **CPU: Intel Core 2 Duo E8400, 3GHz**

While AMD seems to be heading for rocky shoals at the moment, Intel shows every sign of keeping on with CPUs until the heat death of the universe. As I always expect to get at least five years out of a system I build – usually with some minor upgrades – upgradability of the

CPU was the clincher for Intel. We've chosen a fairly fast dual core CPU that's more than capable of the playback and gaming tasks required. Two faster cores makes more sense than four slower cores for the same price: on a HTPC I'm mostly going to be running one, or perhaps two major apps simultaneously.

#### Memory:

##### **2 x 1024MB, DDR2-800, Kingston**

A fairly standard memory selection matching the specs of the motherboard. 2GB of memory should be plenty for pretty much anything I'll be doing with the machine, and I'll still have two DIMM sockets to spare, just in case I have a traumatic brain-event and decide to run Vista.

#### Graphics Card:

##### **ASUS GeForce 9600GT Matrix Edition**

In our experience, graphics cards can be particularly noisy beasts – they have small fans rotating at high speed making nasty high pitched hissing: exactly what we don't want for the HTPC. As we don't need absolutely bleeding edge graphics performance, we took a look at the state of play in moderately capable cards

#### Sound Card:

##### **ASUS Xonar HDAV**

Only having been released pretty recently, the Xonar HDAV is the best looking game in town for high definition audio over HDMI 1.3, which, as we mentioned above, made it the cornerstone for this machine. It's also happy to perform all of its magic under Windows XP, and comes with Blu-Ray and HD-DVD playback software capable of handling and decoding the additional audio goodness of Dolby TrueHD and DTS Master Audio. We went with the version that also has a separate card for analogue audio output, just in case we ever need it.

#### Storage:

##### **Samsung 2.5in 160GB 5400RPM Notebook HDD**

As we alluded to above, part of the plan is to have a separate NAS device acting as a storage backend for all the media files the HTPC will be playing. This means that the hard drive in the machine itself needs to do very little: hold the operating system and installed applications, and not be too slow in booting the machine. I want the HTPC to be as quiet as possible, and modern



**NAS Interior:** Maybe a smaller fan might be quieter?

The LG GGC-H20 is a complete steal for the number of formats it plays, and it gets good reviews all over the shop, so this was a pretty easy decision. We also happened to have a DVD combo drive lying around spare, so we might as well put it in to make direct drive-to-drive copies a convenient possibility.

#### Case:

##### **Thermaltake Bach VB8000BNS**

Finding a decent looking HTPC case that's big enough to accept an ATX motherboard, and doesn't have all sorts of ridiculous knobs, buttons and general 'media centre functionality' cruft besmirching the front panel was tough. We settled on the Thermaltake Bach, which has nice minimal styling and could be purchased without a front panel screen or remote. From the reviews, it looks pretty well constructed and easy to work with internally, and made of nice, high quality materials on the outside. It also came with three cooling fans, and an allegedly quiet power supply, which looked good on paper: more on that later.

#### Keyboard:

##### **Brando USB Wireless Slim Keyboard + Touch Pad**

I've had dubious experiences with wireless keyboards in the past, especially in a home setting. Perhaps it's living in the inner suburbs, where good weather brings four or five unknown wireless networks into my lounge room, but I find some wireless devices somehow can't cover the three metres from couch to AV gear with any reliability, regardless of reception ranges quoted on the box. We decided to take a random punt on a keyboard from Hong-Kong-based manufacturer of USB gadgets Brando: it looked nice, and having a slim, full-sized keyboard with a built in trackpad seemed pretty ideal.

#### NAS:

##### **QNAP Systems TS-209 II**

Finding an appropriate NAS was pretty straightforward – we wanted two drive bays for RAID 1 mirroring, in a small, simple, ethernet connected box. While there are a few such devices, the QNAP TS-209 II gets excellent reviews, and provides both the widest variety of

## When building a new PC, you should always be prepared to spend a few extra dollars to get a system that's easier to put together...

with acceptable cooling: this was when the ASUS 9600GT Matrix Edition caught our eye. Combining both a heatsink and a fan that is automatically activated when the card is under load, it seemed just the ticket. It also didn't need a DVI dongle to generate its HDMI output: hopefully one less thing to go wrong in what is, by all accounts, the dangerously unstable world of HDMI.

notebook drives are practically silent, particularly when compared with their 3.5in brethren. We also ordered a kit to mount the drive in a 3.5in bay: they're pretty easy to find these days.

#### Optical Drives:

##### **LG GGC-H20 Blu-Ray/HD-DVD Combo Drive + Random DVD Combo Drive**

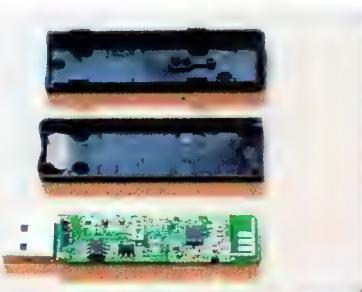


It all looks so easy.

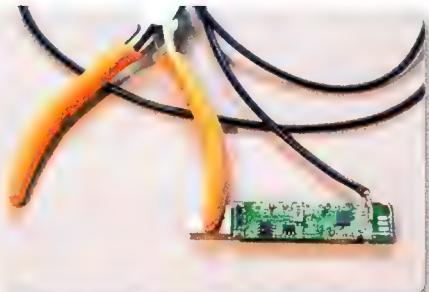
## Keyboard Hacking



The external wi-fi antenna, and USB keyboard receiver.



Inside the USB receiver: note the squiggly antenna at the far right of the PCB.



Attaching the external wi-fi antenna.



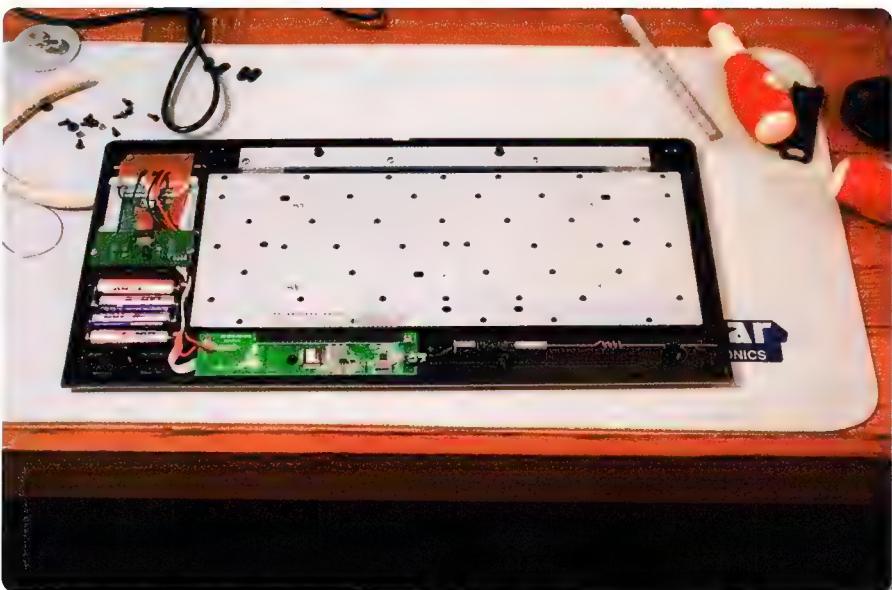
If at first you don't succeed, pull more stuff apart! The inside of the USB keyboard – note the similar antenna at the far right of the bottom PCB.



Attaching the external wi-fi antenna to see if it does better on the keyboard.



Gutting the wi-fi antenna.



The wi-fi antenna in-situ inside the keyboard case.

extra functionality, and the most obvious signs of good support: the open source community is actively developing for and porting utilities to it, and the BIOS running the box is actively being improved by QNAP. As for extra functionality, it provided our two most desirables – a USB printer server, and built in bit-torrent support. It's also pretty cute.

### The Plan: Software

The last detail of the overall design to sort out is pretty straightforward: which operating system was the beastie going to run? Unfortunately for the open source types out there, the require-

ment for Blu-Ray and HD-DVD playback ruled out Linux of any stripe pretty much immediately. We're not crazy enough to attempt to run MacOS X on a PC, so it was going to be Windows: but Vista, XP or Media Centre? Vista is a resource-hungry, DRM-laden, CPU-grinding source of likely trouble and, thanks to the Xonar HDAV, high-def audio and video will work just fine under XP. Media Centre seems to simply be XP loaded up with a whole bunch of Microsoft media software and 'friendly' user interfaces: we'd much rather just have plain old XP and install exactly the software we really want. For audio and video, the applications we like are

these; most of the bunch are completely free, and do a great job:

- Blu-Ray, HD-DVD and DVD Playback: Arcsoft TotalMedia Theatre, which came with the Xonar HDAV.
- Other Video Playback: VLC Media Player. It plays practically anything you might throw at it, and the interface has recently become very slick.
- Audio Playback and Library Management: Winamp, with the Album List plugin installed for a grid display of CD covers.
- CD Ripping: Exact Audio Copy. EAC does the absolute best possible job in ripping even the most badly beaten up CDs to a variety of formats, including MP3 and lossless FLAC (with an external encoder).
- Beating stupid region codes: AnyDVD HD. While a little pricey, this strips the 'region coding' from DVD, Blu-Ray and HD-DVD and allows you to watch movies you've bought overseas.

### Initial Fiddling: The Case and NAS

While we would have rather gotten everything from a single vendor, both to save on shipping and to minimise hassle, a few components were only available from particular retailers. This was rather fortunate, as it turned out, as it gave me something to start fiddling with: the case, keyboard and NAS arrived ahead of everything else.

Externally, the case was pretty much exactly what we were hoping for – a large, stylish black monolith that felt like it could probably survive a fall from orbit. As it came with a power supply and three cooling fans installed, I couldn't resist



One blue LED on each side, with an eye-gougingly bright power LED? Lame!

plugging in an old hard drive as a load and powering it up. Good thing, too, as it turned out: while hurricane is perhaps too harsh a word, the level of noise from the power supply and case fans was certainly higher than we'd expect from what is obviously a HTPC case. Something was going to have to be done.

About two hours later, and after some extended googling and comparison, we figured the best route was to buy a replacement power supply, some silent case fans, and a whole mess of those little rubber fan mounts that isolate fan vibration. We settled on the Thermaltake TR2 RX power supply, which had a 140mm fan, and pretty good sound level specs, and Papst case fans from a supplier in the UK. Perhaps shipping fans from OS is crazy, but Papst had the best specs, and also the best subjective comments in a variety of online forums. We really don't want to notice noise from the machine while watching the quiet bits of 2001.

Powering up the machine also let me see the front panel lighting. And lo, it was both lame and irritating. The power and drive activity LEDs are screamingly bright blue LEDs, and as such really irritating to have shining out below the TV in a darkened room trying to watch a film. The lame was delivered by the strip lighting along the sides of the central panel: one blue LED on each side just looked pretty awful. This, and of course, the empty display window just begging to be filled meant that were destined to walk the dark and obsessive path of case modding (hey! -ed). A brief poke around at **LEDSales.com.au** secured some much nicer looking LEDs, and a poke around **CrystalFontz.com** got us a backlit LCD panel that would run nicely from the unused serial port on the motherboard. Looks like the front panel is going to be good old fashioned obsessive fun to assemble.

We got the NAS up and running pretty much straight out of the box: kudos to the QNAP designers. The TS-209 has bays for two 3.5in SATA drives which I'm going to be using as mirrored RAID, but I'd only gotten one 1TB drive to begin with. I figure that holding off the purchase of the second drive for a couple of months reduces the chance of both drives failing at around the same time. Once again,

though, the noise level was pretty crazy for a device that was supposed to be always-on and inconspicuous. Time to add another quiet replacement fan and more rubber mounting nipples to that order.

## Hacking the Keyboard

Once the keyboard arrived, we optimistically unboxed it and plugged it into the current lounge room machine to check reception. In a word: fail. The three metres from couch to computer was giving very flaky performance, which was a shame as the keyboard itself was pretty neat – slim, light, and a nice feel for typing. Fortunately, we remembered coming across a hack for wireless keyboards a few months back that involved a wi-fi antenna and some minor surgery, and promised extended reception. We sourced a \$20 external wi-fi antenna, and the fun began.

It turns out that most wireless keyboards operate in the same range of frequencies as

## This time, when we tested, things were much better, with coverage in pretty much the whole room. Success!

are used for 802.11b/g wi-fi networks: 2.4GHz. This means that an external wi-fi antenna should be just as good at extending the keyboard range as extending wi-fi networks. I cracked the USB receiver dongle, and had a look around for something that looked like an antenna: in this case a long, heavy squiggly PCB track. I then cut and stripped the cable from the external antenna and soldered the centre wire to the PCB's antenna track, and the outer shielding wire to a grounded spot on the PCB.

Back in the lounge room, we noticed a little improvement, but nowhere near enough to let us recline in comfortable sloth. After some head scratching, we took the gear back to the work-bench for another try – perhaps attaching the antenna to the keyboard rather than the USB dongle would give better results. We cracked the keyboard and located a similar PCB track antenna, moved the external antenna over to that, and cleaned up and resealed the receiver dongle. This time, when tested, things were much better, with coverage in pretty much the whole room. Success!

All that remained, then, was to work out how to attach the antenna to the keyboard in a permanent fashion. I started pulling the antenna apart, and noticed that the actual workings were a pretty compact piece of copper wire with a precise looking coil in the middle: thin enough, it turns out, to fit inside the keyboard casing, right next to the PCB. Double success! Some cutting, soldering and gluing, and the keyboard

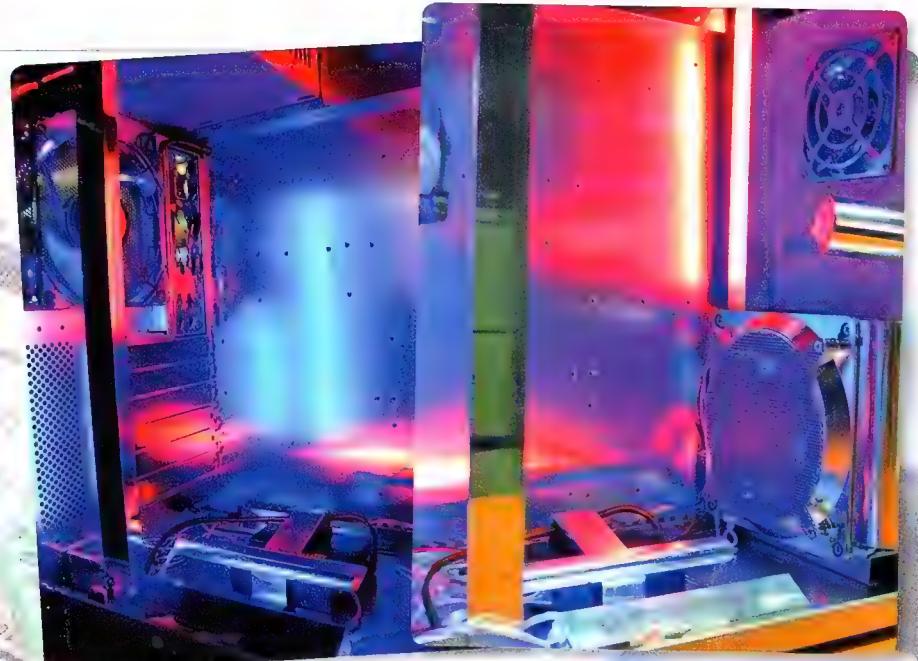
was sealed back up, and working like a charm. Rather makes you wonder why they didn't use a decent antenna to begin with, really.

## Next time...

Next month, in part two, we'll be covering the assembly of the machine in detail, including all the crazy details of keeping things properly quiet, and nice and stylish on the front panel. With occasional dremel and soldering iron action, how can you go wrong? 



After we touched it, we wanted to attack other apes with a femur.



# Fitting Lights 101: 2009 edition

You've spent a lot of money on the perfect gaming rig and windowed case – why not light it up to show off your gear?

Following on from the recent window-fitting tutorial, we thought it relevant to cover the process of illuminating the dark gizzards of the case within.

I remember a day several years ago when the then-incumbent editor made a comment regarding the quality of HotBox (Atomic's old case modding competition) entries as, "Just another case with a side window and a cathode". The forum masses quickly jumped on that comment, and suddenly case-lighting was deemed to be the passé realm of 'n00bs' by the online critics.

I understand the sentiments behind the original comments, but there's a world of difference between simply jamming a light in a case, and the careful planning and installation of a lighting

theme that subtly adds another attribute to a case-mod. Yes, I love my lights!

The problem is... the despots are winning! When we went searching for some of the lights to use for this tutorial we had a huge surprise in store for us – or, in this instance, not in store. It seems that modders are not buying CCFLs in droves, to the point where even JayCar has dropped the 10 and 20cm tubes from their range, and cut right back on the colours that they stock in the 30s. So, check if you can get exactly what you need before committing to a style or colour scheme, as the raw materials might be elusive.

The easiest way to plan a lighting layout is to physically sit the components in the case – however where that is impractical the obvious option is to sketch a basic design plan, taking into consideration the effects of reflection, restrictive shadows (especially from video cards and heatsinks) and panel fit.

Most of the commercially produced lighting used for this type of application is designed to be stuck (or Velcroed) to a flat surface, severely limiting the flexibility of placement and reducing the overall effects that can be created – unless



Planning on paper is good, but actually laying stuff out is better!



Thick brackets are not only strong, but they can also be drilled and tapped for screws.

you're prepared to fabricate some light fittings of your own. Which brings us to the main focus of this tutorial.

The stalwart of most projects is the 30cm Cold Cathode Fluorescent Light (CCFL); these are brilliantly bright and usually have a long lifespan. Most CCFLs are encased in a clear, hard acrylic tube to protect the 'globe' from damage, although it is possible to obtain 'naked' cathode tubes. The power source is usu-

to overcome is that most cases are not very reflective, so much of the luminance (candela per square metre, cd/m<sup>2</sup>) is absorbed by its surroundings. From an aesthetic perspective it's also desirable to have the CCFL hidden from view, so that the effect is a bit more subtle than a spotlight pointed at your face.

The good news is that these issues are relatively easy to overcome with a bit of sheet metal work. Cutting a length of aluminium strip,

## A single 30cm CCFL will provide a large amount of light, but they come with a heap of limitations.

ally a separate step-up transformer that takes a 12V supply and converts it up to 110-620V, but with a current draw of only a few milliamps (mA). A single 30cm CCFL will provide a large amount of light, but they come with a heap of limitations – they're hard to fit in anywhere other than vertically at the rear of the case, or horizontally across the 'floor'. In the first instance there's usually a rear fan in the way and, in the latter, most of the light is blocked on the vertical plane by graphics/expansion cards. The other issue



The CCFL tube is invisible from outside the case.

25 x 3.2mm, to the required length of 120mm, two brackets were bent at 90° to form an L-shape. The lower bracket was also notched so it would clear the internal protrusion of the case foot. The brackets were then positioned against the rear case panel so that they were aligned 'top to bottom', and then drilled and tapped to accept 3mm screws. The two brackets now protrude 60mm in toward the centre of the case, just out of sight through the ACRyan mirrored side-cover window that we installed last tutorial (issue 97).

A section of L-stock, 20 x 12 x 1.4mm, was cut to the vertical distance between the outer edges of the brackets, and then it too was drilled and tapped so that it can be removed easily for case access later. The mounting position for the CCFL is now clear of the obstacles at the rear of the case and, more importantly, the light tube and associated wiring is hidden from view.

The next step is to polish all surfaces of the aluminium with a buff-wheel attachment on a 150mm bench grinder, using Autosol metal polish. This creates a highly effective reflector for the cathode, which will (subjectively) push 30 per cent or more additional light toward the mobo area than with just the naked tube. The

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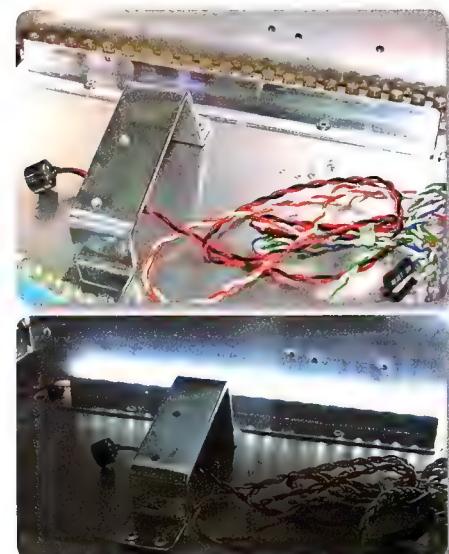
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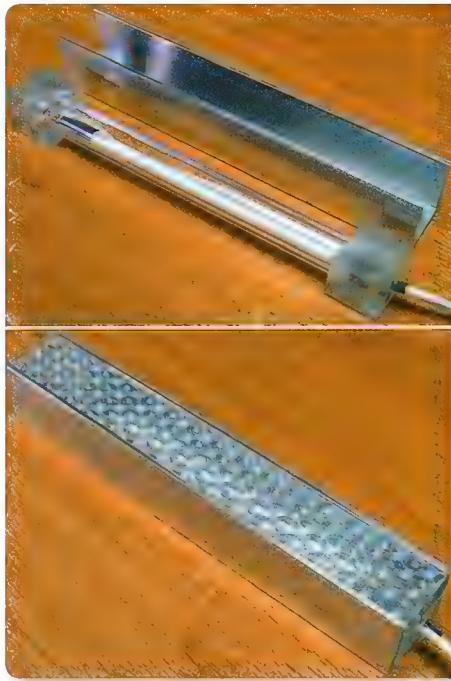
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### Disclaimer

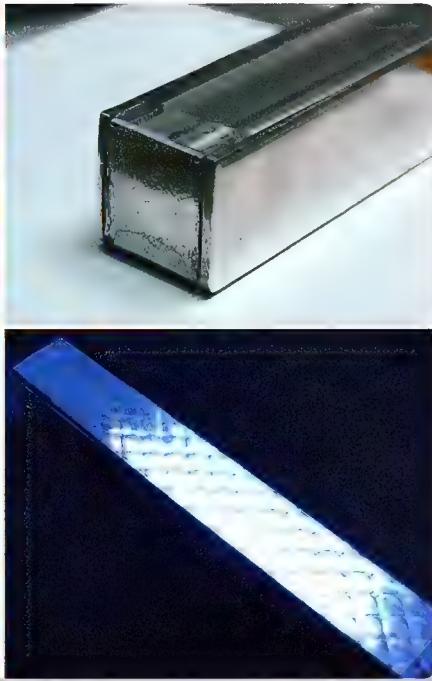
Whenever you pick up power tools, cutting and grinding instruments, or even a can of spray paint, you are putting your general wellbeing at risk from some form of industrial level accident. We take every precaution by wearing appropriate safety equipment, using tools with respect and within their limits, and by not inhaling the contents of glue and paint containers. We suggest that you should follow a similar regime, and seek professional assistance and guidance if you are attempting a task outside of your skill set. NB. Atomic and staff are not responsible for your safety or longevity.



Imagine wrestling with an angry, adhesive anaconda in a confined space...



It's simple, easy to make, and it works a treat. Enough said.



CCFL is then attached to the L-section with 5 Minute Epoxy glue, which will stop it from becoming dislodged during transport.

The next lighting solution that we installed was an innovation that we've not used before, an Ultra-Flex 30 LED Light Strip. As the name suggests, this is a series of 30 LEDs housed in a flexible clear silicone block that will supposedly mould to nearly any shaped surface. It has double-sided adhesive on three surfaces of the light strip, which makes it really frustrating to try and stick it down with any degree of accuracy – imagine wrestling with an angry, adhesive anaconda in a confined space... The answer was to remove the adhesive on the two sides, cleaning off the residual glue with acetone, and to only use the double-sided tape on the base. The area where we were fitting the light strip was shorter than the overall length, so a quick mod with a sharp knife removed 5 of the LEDs.



This CCFL light fitting takes up a mere 12mm of headroom.

we have done before, but it's worth running through the process again as it really is a winner.

Creating an enclosed CCFL light-fitting using aluminium U-section and a diffuser cover is a great way to make a feature out of something that is otherwise, well, ugly. A section of 20 x 20mm U-stock is cut to the length of the cathode, and the interior polished to a mirror shine so that it has excellent reflective properties. If the ends are going to be filled in, two square fillets are cut out of the sides of the aluminium, the 'flap' bent over to 90°, and then the edges smoothed over with a file. The acrylic end-blocks of the CCFL tube are roughed-up with sandpaper to give the 5-Minute Epoxy glue something to grip to, and the CCFL then stuck into position. A small section of light diffusing acrylic, salvaged from an old fluoro batten-fitting, is cut and sanded to shape so that it is a tight, 'interference fit' inside the U-section. The diffuser is then glued into position, and the outer aluminium polished. Although the diffuser seems to slightly diminish the amount of light being emitted, the overall effect is a much wider spread of light around the case.

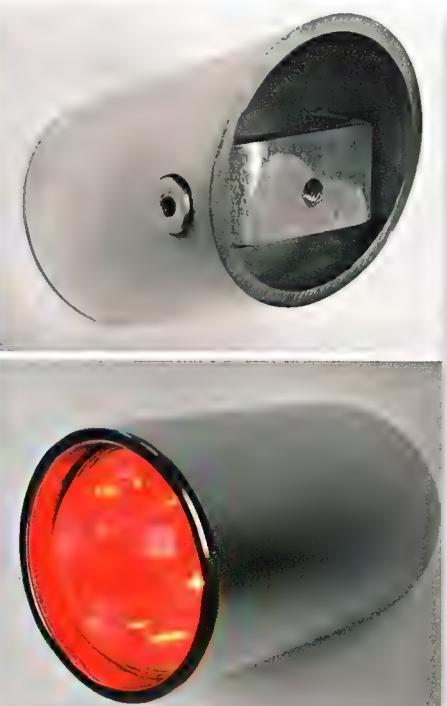
Using CCFL tubes in really restrictive area can be achieved by using bare tubes in a protective cover. If you only have access to encased cathodes, the first step is to carefully remove the tube from the acrylic cover by twisting of the acrylic end blocks and cutting the sides out to free up the power wires. The cathode tubes are made of fragile glass, so take care not to bend or twist them. In this instance we used a 5cm length of r-section aluminium, 24 x 12mm, highly polished to reflect the maximum amount of light. The CCFL tube was then held in place with hot glue, as it has a degree of

We weren't sure if this would be detrimental to the unit or not, but post-operative testing has been positive so far! To aid lighting efficiency and to keep everything secure, a 21cm length of 20 x 12mm L-stock was cut, drilled, polished and riveted to the case floor, pressed hard up against the silicone housing. The LED's now face upward, spilling an impressive amount of light toward the base area of the mobo tray.

The next bit of fabrication is something that



Somehow we feel that this was inspired by the ghost of a 1950s Cadillac!





Don't overlook that LED fans are a light source too.

elasticity and will absorb shocks. This fitting can be held in place with either double-sided tape, or by the use of rivets in the lower reflective section, in front of the glue.

## Frickin' LAZER BEAMS

One of our all-time favourite 'accent' lights is the three-spread Lazer LED, but you will

want to use the original 'Lazer' brand – there are cheaper knock-offs out there, but they just don't pack the lighting punch of the real thing. The great thing about the Lazer LED is its diminutive size, just 42 x 16 x 10mm; the awful thing is that they are really only designed to mount on a flat surface. To gain more flexibility, and create some interesting effects, the answer is to fabricate a mounting bracket out of 0.8mm thick aluminium strip, which can then be folded into any angle that you want. The Lazer LED is attached to the bracket using two 3mm screws, and then the assembly can be either screwed or riveted to the case.

Another great light that is let down by its mounting options is the Lazer LED Spotlight. These six-LED units are fantastic for adding accent lighting, especially when using a contrasting colour, but are also only designed to focus directly ahead of their flat base. The other issue is that the double-sided mounting tape has a very limited lifespan inside of a warm computer case. To make up a light fitting for the spotlight is a little more complicated, but still within the realms of most modders. Firstly, a section of aluminium tube 32mm outside diameter (27mm inside diameter) was cut to length, with the mounting end cut at a 20° angle. A short length of 12 x 3mm strap was bent into a U-shape that would slide down inside the rear of the tubing, and that was then drilled and riveted into place as a mounting bracket. This bracket was

then drilled and tapped to accept a 3mm screw. The front edge of the tubing was chamfered off and then the whole assembly, including the inside, polished to a mirror shine.

In the 'Fitting Fans 101' tutorial from a couple of issues back, we made mention of fitting fans internally as a way of moving air around to areas that need additional cooling. The other potential attribute of this is to use LED fans to add extra lighting into those areas as well. Usually this type of mod will require a 'bulkhead' to attach it to, and we will look at that process in a future issue. If you use chrome or polished fan grills, the reflections off of other case lights will also add their own lighting effects.

Over the course of this tutorial we have used the term, 'polished to a mirror shine' far too many times, but the fact is that this is a process that will really take an average lighting mod and make it stand out. As mentioned, many PC cases have a dull internal finish that absorbs light, whereas a polished or mirror surface will create more light through multiple reflections of the initial source. For the moment, this is the outcome with the lights installed into a Lian Li PC-A07, and already it is obvious just how much the reflection of the aluminium chassis plays a part in spreading the light right around the case – in the next 101 tutorial, 'Floors and Walls' we will take that concept further, and look at some options for hiding wires and transformers.  RP



# Studying outside of NSW

Chris Taylor love all Australians equally!



To prevent accusations of us being biased towards New South Wales, we've decided this month to take a look at what's on offer at the universities of the Australian Capital Territory, Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia. We focus on the undergraduate offerings, as we've made the assumption that the majority of people reading this will be looking at entering the university system for the first time. If you've already got an undergraduate degree to your name and are interested in further studies, you can surely find information on each university's postgraduate offerings by digging around the provided URL. Too, you might notice that we don't mention every campus a university has (for instance, the Alice Springs campus of Charles Darwin University). We've intentionally ignored the campuses that don't run the courses detailed in this article.

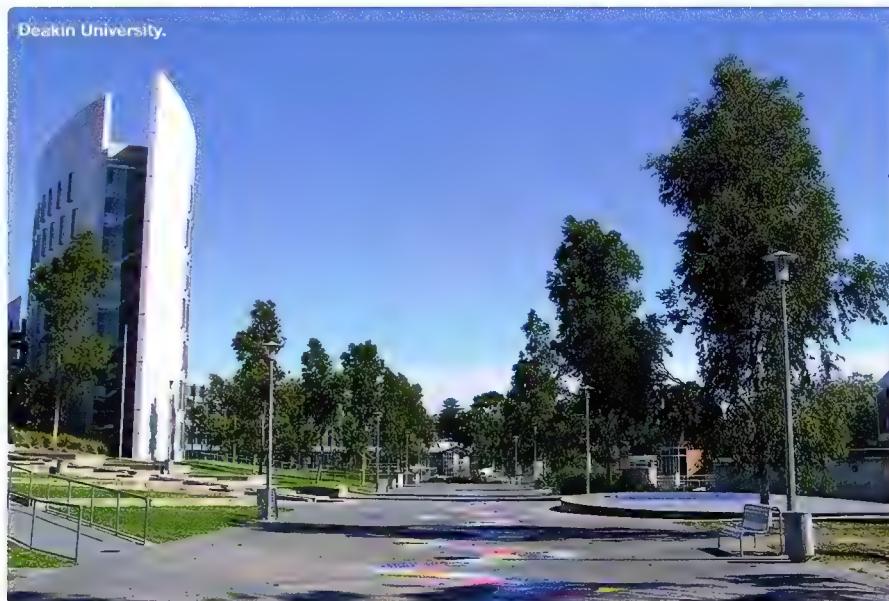
## Australian National University

**Web:** [studyat.anu.edu.au](http://studyat.anu.edu.au)

**Location:** Canberra

**Degree programs:** Bachelor of Computer Science, Bachelor of Information Technology, Bachelor of Software Engineering

**Notes:** Pretty much every time our universities are ranked on merit, Australian National University comes first. Naturally, Australian National University is a member of the Group of Eight.



## Bond University

**Web:** [www.bond.edu.au](http://www.bond.edu.au)

**Location:** Gold Coast

**Degree programs:** Bachelor of Business (Electronic Commerce), Bachelor of Business (Business Information Systems), Bachelor of Computer Games, Bachelor of Information Technology, Bachelor of Multimedia (Advertising), Bachelor of Multimedia Design (Mass Communication), Bachelor of Multimedia Design (Production)

## Central Queensland University

**Web:** [www.cqu.edu.au](http://www.cqu.edu.au)

**Location:** Bundaberg, Mackay, Rockhampton

**Degree and diploma programs:** Associate Degree of Information Technology, Bachelor of Digital Innovation, Bachelor of Information Systems, Bachelor of Information Technology

## Charles Darwin University

**Web:** [www.cdu.edu.au](http://www.cdu.edu.au)

**Location:** Darwin

**Degree and diploma programs:** Diploma of Network Engineering, Bachelor of Information Technology

**Notes:** The Bachelor of Creative Arts and Industries/Information Technology double degree is ideal for those wanting to get into games

development or animation. Too, Charles Darwin University, with campuses in Darwin and Alice Springs, is the only university in the Northern Territory.

## Curtin University of Technology

**Web:** [www.curtin.edu.au](http://www.curtin.edu.au)

**Locations:** Bentley, Esperance, Kalgoorlie, Karratha, Margaret River, Miri, South Hedland

**Degree programs:** Bachelor of Arts (Multimedia Design), Bachelor of Commerce (Business Information Systems), Bachelor of Commerce (Business Information Technology), Bachelor of Engineering (Computer Systems Engineering), Bachelor of Engineering (Electronic and Communication Engineering), Bachelor of Engineering (Software Engineering), Bachelor of Science (Chemistry and Scientific Computing), Bachelor of Science (Computer Science), Bachelor of Science (Information Technology), Bachelor of Science (Mathematical Sciences and Computing), Bachelor of Science (Physics and Scientific Computing), Bachelor of Science (Software Engineering), Bachelor of Technology (Computer Systems and Networking)

Notes: Curtin University of Technology has exchange programs with universities in more than 20 countries.

## Deakin University

**Web:** [www.deakin.edu.au](http://www.deakin.edu.au)

**Locations:** Burwood, Geelong

**Degree programs:** Bachelor of Commerce (Business Information Systems), Bachelor of Commerce (eBusiness), Bachelor of Science (Information Technology), Bachelor of Science (Multimedia Technology)

## Edith Cowan University

**Web:** [www.ecu.edu.au](http://www.ecu.edu.au)

**Locations:** Joondalup, Mt. Lawley

**Degree programs:** Bachelor of Computer Science, Bachelor of Engineering (Computer Systems), Bachelor of Information Technology, Bachelor of Science (Computer Science)

## Flinders University

**Web:** [www.flinders.edu.au](http://www.flinders.edu.au)

**Location:** Adelaide

**Degree programs:** Bachelor of Computer Science, Bachelor of Engineering (Computer Systems), Bachelor of Engineering (Robotics), Bachelor of Engineering (Software), Bachelor of

Information Technology, Bachelor of Science (Computing and Digital Media)  
 Notes: The Bachelor of Engineering (Robotics) is the only robotics course on offer in South Australia.

## Griffith University

**Web:** [www.griffith.edu.au](http://www.griffith.edu.au)  
**Location:** Gold Coast, Nathan, South Bank  
 Degree programs: Bachelor of Games Design, Bachelor of Information Technology, Bachelor of Multimedia

## James Cook University

**Web:** [www.jcu.edu.au](http://www.jcu.edu.au) **Location:** Townsville  
 Degree programs: Bachelor of Information Technology (Business Computing), Bachelor of Information Technology (Computer Technology), Bachelor of Information Technology (E-Business Entrepreneurship), Bachelor of Information Technology (General Computing), Bachelor of Information Technology (Geographical Information Systems), Bachelor of Information Technology (Industry Professional), Bachelor of Information Technology (Multimedia Game Development), Bachelor of Science (Computer Science)

## La Trobe University

**Web:** [www.latrobe.edu.au](http://www.latrobe.edu.au)  
**Locations:** Bendigo, Bundoora  
**Degree programs:** Bachelor of Computer Science, Bachelor of Computer Science (Games Technology), Bachelor of Computer Science (Systems Engineering), Bachelor of Information Systems, Bachelor of Information Technology, Bachelor of Software Engineering

## Melbourne University

**Web:** [www.unimelb.edu.au](http://www.unimelb.edu.au)  
**Location:** Parkville

**Degree programs:** Bachelor of Engineering (Informatics), Bachelor of Engineering (Software Engineering), Bachelor of Science (Computer Science)

Notes: A member of the Group of Eight. Held in similar regard to Australian National University.

## Monash University

**Web:** [www.monash.edu.au](http://www.monash.edu.au)  
**Location:** Berwick, Caulfield, Clayton, Gippsland  
 Degree programs: Bachelor of Business Information Systems, Bachelor of Computer Science, Bachelor of Information Technology and Systems (Applications Development and Networks), Bachelor of Information Technology and Systems (Business Systems), Bachelor of Information Technology and Systems (Information Management), Bachelor of Information Technology and Systems (Information Systems), Bachelor of Information Technology and Systems (Internet Systems), Bachelor of Information Technology and Systems (Multimedia Applications), Bachelor of Information Technology and Systems (Multimedia Games Development), Bachelor of Information Technology and Systems (Net-Centric Computing), Bachelor of Information Technology and Systems (Security), Bachelor of Information Technology and Systems (Systems Development), Bachelor of Software Engineering, Bachelor of Technology (Computer Studies)

Notes: A member of the Group of Eight.



networking and Security)

Notes: Murdoch University was the first university to offer games development courses in Western Australia.

## Murdoch University

**Web:** [www.murdoch.edu.au](http://www.murdoch.edu.au)  
**Location:** Perth  
**Degree programs:** Bachelor of Business Informatics, Bachelor of Business Information Systems, Bachelor of Science (Computer Science), Bachelor of Science (Cyber Forensics, Information Security and Management), Bachelor of Science (Games Software Design and Production), Bachelor of Science (Games Technology), Bachelor of Science (Internet Computing), Bachelor of Science (Internet)

## Queensland University of Technology

**Web:** [www.qut.edu.au](http://www.qut.edu.au)  
**Location:** Gardens Point  
**Degree and diploma programs:** Diploma in Information Technology, Bachelor of Corporate Systems Management, Bachelor of Games and Interactive Entertainment, Bachelor of Information Technology

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## RMIT University

**Web:** [www.rmit.edu.au](http://www.rmit.edu.au)

**Location:** CBD

**Degree and diploma programs:** Associate Degree in Applied Science (Information Technology), Associate Degree in Engineering Technology (Network Engineering), Bachelor of Business (Business Information Systems), Bachelor of Computer Science, Bachelor of Engineering (Computer Systems Engineering), Bachelor of Engineering (Network Engineering), Bachelor of Information Technology (Computing and Internet Technology), Bachelor of Information Technology (Games and Graphics Programming), Bachelor of Software Engineering, Bachelor of Technology

## Swinburne University

**Web:** [www.swinburne.edu.au](http://www.swinburne.edu.au)

**Locations:** Hawthorn, Prahran

**Degree programs:** Bachelor of Arts (Games and Interactivity), Bachelor of Business Information Systems, Bachelor of Computing, Bachelor of Computing (Network Design and Security), Bachelor of Design (Multimedia Design), Bachelor of Engineering (Telecommunications and Network Engineering), Bachelor of Information Technology, Bachelor of Multimedia, Bachelor of Science (Computer Science), Bachelor of Science (Professional Software Development)

**Notes:** With some of Swinburne University's courses, you'll have the option of doing a further year. Not of 'study' as such, but of industry-based learning. International students are not eligible for this.

## University of Adelaide

**Web:** [www.adelaide.edu.au](http://www.adelaide.edu.au)

**Locations:** North Terrace, Ngee Ann-Adelaide Education Centre

**Degree programs:** Bachelor of Computer Graphics, Bachelor of Computer Science, Bach-

elor of Engineering (Software Engineering), Bachelor of Mathematical and Computer Sciences Notes: A member of the Group of Eight. Too, it's the oldest university in South Australia.

## University of Ballarat

**Web:** [www.ballarat.edu.au](http://www.ballarat.edu.au)

**Location:** Ballarat

**Degree and diploma programs:** Associate Degree of Information Technology, Bachelor of Information Technology, Bachelor of Information Technology (Business Systems), Bachelor of Information Technology (Computer Games), Bachelor of Information Technology (Professional Practice)

## University of Canberra

**Web:** [www.canberra.edu.au](http://www.canberra.edu.au)

**Location:** Bruce

**Degree programs:** Bachelor of Business Informatics, Bachelor of Information Technology, Bachelor of Information Technology (Mainframe Computing), Bachelor of Software Engineering

## University of Queensland

**Web:** [www.uq.edu.au](http://www.uq.edu.au)

**Location:** Ipswich, St Lucia

**Degree programs:** Bachelor of Information Technology, Bachelor of Multimedia Design, Bachelor of Science (Computer Science)

**Notes:** A member of the Group of Eight.

## University of South Australia

**Web:** [www.unisa.edu.au](http://www.unisa.edu.au)

**Locations:** City West, Mawson Lakes

**Degree and diploma programs:** Associate Degree in Information Technology, Bachelor of Business (Management of Information Technol-

ogy), Bachelor of Business Information Systems, Bachelor of Computer and Information Science, Bachelor of Computing (Electronic Commerce), Bachelor of Information and Communications Technology (Logistics), Bachelor of Information and Communications Technology (Networking), Bachelor of Information Systems, Bachelor of Information Technology (Computing and Multi-media), Bachelor of Software Engineering

## University of Southern Queensland

**Web:** [www.usq.edu.au](http://www.usq.edu.au)

**Location:** Toowoomba

**Degree programs:** Bachelor of Engineering (Software Engineering), Bachelor of Information Technology (Applied Computer Science), Bachelor of Information Technology (Information Systems Development), Bachelor of Information Technology (Information Technology Management), Bachelor of Information Technology (Networking and Security), Bachelor of Science (Information Technology)

## University of Tasmania

**Web:** [www.utas.edu.au](http://www.utas.edu.au)

**Locations:** Cradle Coast, Hobart, Launceston

**Degree and diploma programs:** Associate Degree in Computing, Bachelor of Computing, Bachelor of Engineering (Computer Systems Engineering), Bachelor of Information Systems, Bachelor of Science (Computer Science)

**Notes:** The only university in Tasmania.

## University of the Sunshine Coast

**Web:** [www.usc.edu.au](http://www.usc.edu.au)

**Location:** Sippy Downs

**Degree programs:** Bachelor of Business (Information Systems), Bachelor of Information and Communications Technology, Bachelor of Software Engineering

## University of Western Australia

**Web:** [www.uwa.edu.au](http://www.uwa.edu.au)

**Location:** Perth

**Degree programs:** Bachelor of Computer and Mathematical Sciences, Bachelor of Engineering (Computer), Bachelor of Engineering (Software), Bachelor of Science (Computer)

**Notes:** A member of the Group of Eight.

## Victoria University

**Web:** [www.vu.edu.au](http://www.vu.edu.au)

**Location:** Footscray, St. Albans

**Degree programs:** Bachelor of Arts (Multimedia), Bachelor of Arts (Interactive Media Games), Bachelor of Business (e-Commerce), Bachelor of Business (Computer Systems Management), Bachelor of Science (Computer and Mathematical Sciences), Bachelor of Science (Computer Science), Bachelor of Science (Information Technology), Bachelor of Science (Internet Technologies and Applications)





# Gamer chicken or gamer egg?

## Survey says geek girls are easy? Not so fast!

**A** recent web-based survey showed that 40 per cent of Everquest II gamers are women. Surprise, surprise, am I right?

What was surprising, for the survey co-ordinators at least, was that the EQ II women were five times more likely to identify as bisexual than the general populace. That story got a couple of hundred DIGGs and cheap jokes. Surprise, surprise, again.

About three years ago, I assisted Dr Farah Mendlesohn, from the University of Middlesex, in analysing a survey of 900 science fiction fans. I got called in because the survey had grown from its original intention. Dr Mendlesohn thought it would be completed by 50 people, and asked them to give an idea of what science fiction

He's a bit cagey about how that "less traditional" aspect might work, and with good reason. After all, his data doesn't say whether playing MMOs makes you more likely to be bisexual, or that being bisexual then makes you more likely to sign up for Everquest II. The two coexist, and while he can definitely say from the data that the proportion of bisexual women in the MMO-playing population differs significantly from what you might expect based on the population at large, the why of it all is still in the dark. Caplan implies that both might be part of a larger single effect – that is that breaking normal social norms results in being more likely to play games and be bisexual. But there are many other possibilities. It could be that all MMO players are actually men

## Caplan's phrase has an aura of "hot bi gamer girls willing to do anything!!1eleventyone!1!!"

they read as children, and also asked some demographics. It wasn't as methodologically robust as it might have been, but one of the unambiguous findings to come out of it was that 50 per cent of science fiction readers are women (Yay!). The other, more surprising at the time, was that 30 per cent of science-fiction reading women under 40 consider themselves bisexual and another 11 per cent consider themselves bi-curious.

That's, again, at least five times higher than the general populace.

Now, obviously not every geek girl is lustng after the blood elf-playing girl from three doors down, but it's enough to make you wonder what makes geeky girls apparently more likely to be sexually non-mainstream.

The theory that Everquest head researcher Scott Caplan came up with is that geek women generally aren't tied strictly to gender role norms. As Caplan says, as part of this theory: "I think what you would find in this population are going to be people who are in other ways less traditional than the majority population."

In other words, gender norms and sexuality don't really go together, as far as the research literature suggests. That's a big, and incorrect, assumption on Scott Caplan's part. Rather than being a big, exciting survey, what we're left with is one really interesting data point. And that's even before we get into the whole issue of how to measure bisexuality – attraction or action? Is that a can of worms I see before me?

Besides, where does he get the idea that gaming is non-traditional or transgressive of social norms for women?

If you've got this far, you may be wondering where geek guys fit into all of this. For SF-reading guys, at least, Dr Mendlesohn's survey data says that, well, they're pretty damn average. And since the Everquest II survey didn't report anything about male Everquest II players and their sexuality, I'm assuming that's not worth mentioning – ie, normal. ☺

Zara Baxter wants to be very clear that surveys do not suggest you ask the nearest geek girls for a threesome. .

[zbaxter@pcauthority.com.au](mailto:zbaxter@pcauthority.com.au)

pretending to be bisexual women in the hopes of some hot cybersex. *Shudder*. It could be that bisexual women take self-reporting surveys far more often than usual, or, as one wag in DIGG comments suggested, perhaps it's a commentary on the universal unattractiveness of gamer guys. Don't hurt me, I'm just the messenger.

Either way, the Caplan's phrasing has an aura of "hot bi gamer girls willing to do anything!!1eleventyone!1!!", and I'm willing to bet that signups for Everquest II hit a high point after that survey.

If the theory about being less traditional in a range of ways holds up, then other research should confirm it. You might think that science fiction survey is supporting data. But if you check other studies, conducted less informally, there's no evidence that transgressing social norms in other ways makes you more likely to be bisexual, or vice versa. In fact, there's evidence from research that if you are of an alternate sexuality (homosexual, bisexual, asexual), you're less likely to be thought badly of by your peers than if you breach gender norms, so there's a strong disincentive.





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+12V 4+4pin POWER	x 1	x 1	+12V 8pin POWER +12V 4pin POWER	x 1	+12V(4+4)pin POWER x 1
Peripheral	x 4	x 7	x 7	x 1	x 1
Floppy	x 1	x 1	x 1	x 4	x 6
SATA	x 4	x 6	x 6	x 2	x 2
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# GAMEPLAY

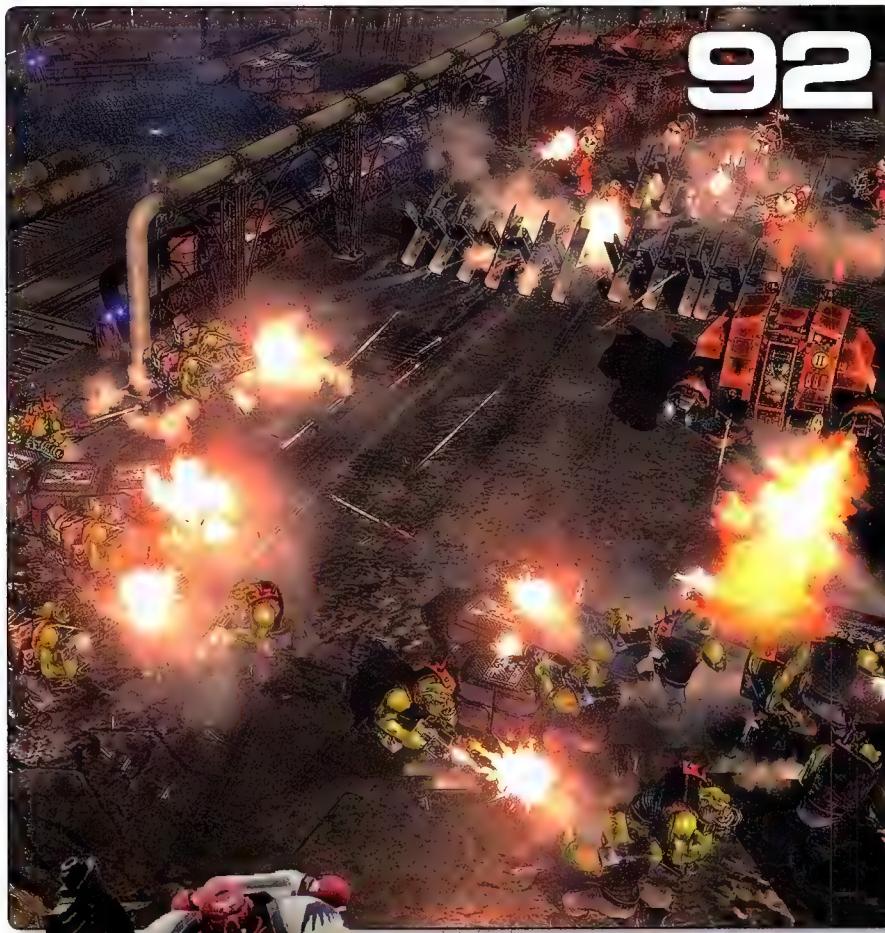
## GAMES, GAMING AND FILM COVERED... ATOMIC-STYLE

It's a huge month for strategy – even the non-strategy games have strategy bits and pieces in them!

First up we have Seamus Byrne sitting down with a chat from the local branch of The Creative Assembly – the big brains behind some of best Total War titles. But this time they're talking up their new strategy property – *Stormrise*! For all the deets, plus some shiny pics, you've got to check it out.

On the review front we are thoroughly and utterly addicted to, impressed by and in love with *Dawn of War 2*. We've got a full preview of the game, plus, if you cast your eyes downward, a special, Atomic/THQ giveaway. If you love power armour, you'll NEED this prize.

To round things out we've got *Codename: Panzers: Cold War*, *The Godfather 2*, and all the sword swinging action of *Lord of the Rings: Conquest* to whet your appetites.



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# The Rise before the Storm

The Creative Assembly shows off their RTS with a surprising new look to Seamus Byrne.

**B**est known for its Tactical Strategy series Total War, The Creative Assembly has given its Australian office the opportunity to branch out and create a new real-time strategy title, Stormrise. Like the unique standing of Total War, Stormrise has its eyes set on nothing less than changing the face of strategy, shifting the perspective into a third-person unit view. And that's just for starters. Atomic catches up with Creative Director Ken Turner to find out exactly what they've broken — and how they plan to fix it.

**atomic** What is the basic idea behind Stormrise and this new take on the RTS?

**Ken Turner:** We've been working on the Total War stuff for years now, and that's reasonably innovative in its approach to strategy so we wondered how we could branch out further. What we really set out to do with Stormrise was to shake things up in strategy. For ages we've been playing the same sort of game, just refined and polished over and over. Ever since

Dune, really. We wanted to start by looking at how we could add more immediacy. How we could actually be down in the action instead of in the god view.

It was also about breaking the fact strategy games normally play on essentially a 2D battlefield. It's got height, it's got 3D buildings, but you very rarely get to properly use the third dimension, and so we really looked at how we can go into buildings, go on top of things, go underground and actually fly over everything. In the marketing stuff, we talk about verticality, but really, it is the full utilisation of the environment, of a proper environment for tactics and for strategy.

We're a little Australian company, but we set out to change the face of strategy, to change a genre, maybe add a sub-genre to a genre that, you know, isn't necessarily stale but it's definitely very mature.

**atomic** What can you tell us about the world of Stormrise?

**KT:** Stormrise is being bundled under a sci-fi/post-apocalyptic setting, but we really set out to see how we could create a fictional world where we could justify pretty much anything we think would be cool. Giant robots, big beast things, dudes who could have supernatural powers, and put it together in a way that makes internal sense. Because strategy games are about the thinking, but there's also the 'I like to blow shit up' element. Take this great, hulking giant crab thing and tear some infantry apart. Or rain acid down and sizzle them into little pieces. Those are the things that are viscerally satisfying.

The opening cinematic begins kind of 100 years from now as we're trying to deal with global warming and a lot of other unrest around the world. And then the character we follow is a guy called Aidan Geary; he's previously a commander of the armed forces and he goes into hibernation at this point, and then we come out many, many years later to a world that's changed, a brave new world. So what



happened back then? Everyone refers to it as The Event. There's mystery surrounding exactly what happened. Needless to say, it was terrible.

A lot of the guys can actually hibernate underground and they later emerged to become the Echelon — a future military with all the cool toys you could expect. Those on the surface had to deal with it, and a lot of them perished. But a few were able to survive as they had some special properties — I don't want to give too much away. Over generations they purify their abilities and they become the Sai — they've got a kind of internal power which isn't actually magic, as there is an underlying science and lore to everything so it all fits together.

**atomic** How do the sides play? And what are your favourite units?

**KT:** The two sides play to different styles. You can imagine the Echelon is very much about superior firepower, but holds them at a distance. Creating very well-defended strong points, then when you strike, you strike quickly with shock and awe. The Sai are about guerrilla fighting, about blending into the environment and not

being seen.

We allow for up to 40 platoons of up to ten individual units, so up to 400 units. Larger vehicles are a group of one and the infantries are groups of ten. In four versus four multiplayer each player would have ten platoons to play with. There's nine unit types for both factions split into three categories. There's three infantry types, three armor/beast types and three airborne types. Echelon are very strong with

playing the game you earn equipment and you can then kit out these characters and customise them. Do you give a flight pack to the Echelon power armor? Do you allow the Sai seer to have teleport abilities? Do you want your commander to be a frontline unit or do you want them to be a fast unit, to get to places, to fix problems quickly, or to be a support unit and heal those around them. There's up to six equipment slots, but some

## The Brood Queen is like this giant crab thing: once it's on the battlefield, everyone knows it's there.

their air, but a lot of their infantry aren't that strong compared to the armor/beast level of the Sai.

Then there is actually a tenth class for both sides, which is a character class, like a hero. We wanted to embody you as the commander on the battlefield. The Echelon has power armor and for the Sai there's a seer. Through

of the equipment takes up multiple slots, so you're picking and choosing.

One of the units that really excites me is an Echelon armor unit called the Ark Hammer, which is essentially a hover tank that transforms into an artillery installation. Then you can essentially paint targets for it so you can indirectly order it to shoot, which is really cool.

On the Sai, everybody loves a big beast. The Brood Queen is like this giant crab thing, once it's on the battlefield, everyone knows it's there. The camera shakes and the sound is pumping. One of the cool things the Brood Queen can do is incubate. It sits, pulses for a while, then spits out all these baby ones and they munch on infantry, and after a while they just explode. But you can actually take control of them and drive them around. The camera goes right down close to the ground, it's like being on top of a remote controlled car as they're super fast. So yeah, the Brood Queen!

**atomic** So what's really going on with this 'verticality'?

**KT:** What the verticality allows is that there's some jumping, there's flying, you can jump from rooftop to rooftop. In the design we talked about the four strata or four levels of game play — on the ground, on top of buildings, in



Top-down RTS, down to third-person shooter, all in one smooth evolution.



the air, and underground. We completely had to change the way we looked at pathing in everything because, obviously, instead of just path searching across a big 2D thing it's now really under and over and around and through and climbing staircases.

The first time I got one of the units, the Sai assassin called the Specter, onto the rooftop looking over everything – almost Assassin's Creed style – and from there I was able to tell units where to go. You really feel this verticality aspect, and up there I can command almost like a traditional RTS with the god view. But I have to earn high ground to do that.

Some of our single player levels are

completely underground – a couple of underground bases and fortress type things – and they are actually taller than they are wide, so you're kind of playing down through them instead of across. It sounds really intimidating to begin with but we introduced the verticality slowly. We kind of lead you into feeling comfortable dealing with strategy and tactics

with the verticality. Having the camera in third person essentially means bringing the spatial awareness that you have in a shooter and applying that to a strategy game.

**atomic** You've mentioned some big changes to the traditional RTS control scheme. Can you detail how the 'Playbook' and the

**Having the camera in third person essentially means bringing the spatial awareness that you have in a shooter and applying that to an RTS.**



'Whip' controls work?

**KT:** The playbook is kind of like how Mass Effect recently had a radial ability selector. It's behavioral things like be defensive or aggressive, and also where you activate abilities and make weapon choices. On PC you just hold down, by default, the Alt key. Then use the mouse to select which is the thing on the radial wheel.

We've got enough slots in the Playbook so that you can actually turn on and off individual abilities while they're still grouped in a company. It does prioritise some of the abilities, but mostly you can get to all the really cool stuff while they're in a group. So you can have your Echelon enforcers with their riot shield up and then be calling special abilities on maybe the hero or one of the more elite units that you've



grouped with them.

And then there's the whip. This is the way you change who you currently have active. Practically the whole game works through natural line of sight. If you can't see it, your units can't see it, and who knows what the enemy is doing? There's no need to render a fog of war or anything like that.

The whip kind of works like an air hockey move. You hold down the right mouse button

and just slide the mouse in a direction and release and that will whip you around a unit. The day we turned it on the QA guys, a lot of them traditional RTS fans, gave us the 'Oh my god! That's awesome!' They were really concerned that the PC interface would be a dodgy port back from the console. Or that we'd drop it all and go back to a standard RTS interface. We wanted it to feel good, not just function. It's innovative on the console,

but doing the air hockey slide-slide-slide feels awesome on the PC too.

**atomic** How do you think people will react to such a big change?

**KT:** Back in the day, when Quake came out there was a huge debate over whether people were going to mouselook or not. There were people who were adamant that after Doom II they didn't need to do that. They were faster with the keyboard and that was the way it was. So I kind of look at it that way. People are averse to change, but when what's presented is elegant, simple and empowers them to do more, hopefully more people get over the initial shock and get through the learning curve. And the curve isn't that big — it's just about taking the moment to realise some of the expectations.

On the PC, to make a strategy game where you are third person with your units, it needs something different. But because it isn't god-cam, PC RTS fans should realise that this is different and they'll come with more of a blank slate.

From a game theory perspective, if people really get into this, and I hope they will, then they may see that this kind of a new convention, and a new way of looking at strategy. 

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# Dawn of War II

The Blood Ravens are back, bigger, badder, and madder than ever. **[PREVIEW]**

Relic Entertainment has always been a very solid development house, but its outstanding effort at re-inventing RTS with Dawn of War put it on the map as a seriously innovative player. The company did one better again, taking everything it learnt about balance and gameplay in DoW, added a new Physics engine, and stunned the world with the even better Company of Heroes. Now, the second Dawn of War title is upon us, and Relic seems to have trapped lightning in a bottle for a third time.

Dawn of War II returns the Blood Ravens chapter of Space Marines to center stage, this time engaged in a grim battle to secure their very existence. The sector housing their recruiting worlds is under attack from a host of foes – the elegant but deadly Eldar, the vicious Ork hordes, and the most terrifying threat of all... the Tyranids, monsters from beyond our galaxy that have only one thought.

Devour all life.

The Warhammer 40,000 universe has had tens of thousands of words written about it, across wargames, tabletop roleplaying titles, and even novels. And yet the writers of DoWII have done a wonderful job of drip-feeding all the background

and information that a player may need as the game opens, as indeed as it progresses towards the single player campaign's end. This is done with short descriptions of places and characters during loading screens, but a lot of the flavour of

40k comes across via the named characters you'll be controlling through each battle.

This time, gone are the endless hordes of squads and units churned out from barracks and similar structures you need to build. Instead, you can only control four units at any one time, chosen from a pool of six or so units. Each squad is small, too – the largest only has four marines in it – but this allows those units to be far more important, more heroic on the field of battle.

At the end of a typical fight, for instance, as you're going through loot, you'll often be privy to a conversation between squad leaders – not only do you get their own background in this manner,





but as they discuss past battles and what they know of the enemy, so too are you educated. What particularly impressive is that even 40k nerds (and there might be one or two in the office) are not going to be annoyed or disappointed – this is the grim dark future that we know and love, and it's been very well-treated by Relic.

The strategic game has had some serious work done on it, too. Expansions for the previous game introduced a campaign map allowing players to plot out who they fought and what ground they wanted; in DoWII you've got an entire sector of worlds to fight for. As the campaign progresses new missions open up to advance the narrative, but you'll also need to defend captured installations and deal with ongoing hotspots. If you lose a mission – and all your squad leaders are hors de combat – you'll be picked up by an emergency extraction. The consequences of that loss might be losing key battlefield intelligence (you get information on each upcoming battle depending on the amount of Comms Arrays you hold in the sector), or that a key NPC may come back again even stronger. What's more, these defence missions and random incursions have a time limit – towards the end of the game, you may have four or more missions you need to complete, but only three days in which to do it. It makes for a tense strategic game, with some real tough decisions – choosing what province or installation to loose.

But the true joy of the game is the real time combat, and it's better than ever. With your limited

selection of small squads you'll face seemingly endless hordes of aliens, with a seemingly endless array of deadly weapons. Relic has taken a cue from MMOs, and gear – weapons, armour, equipment, now drops randomly from baddies, and you'll also get new stuff as a reward for completing each mission. Your squads level up, too, unlocking new abilities and skills depending on how you spend XP. What this leads to is a unique ability to customise your troops for the mission at hand and your grander play style. Want all your units to be close combat oriented? Can do. Prefer the ranged approach, even for your jump-pack assault specialists? Not a problem. And the gear drop-rate makes playing 'just one more game' an addiction of near Diablo-like intensity. Combined with a stronger AI and a better cover mechanic, each game is a superior tactical challenge.

And it all looks so good! Buildings crumble in clouds of dust, foliage withers under intense fire, craters glow in the aftershock of orbital bombardments (and oh boy are these epic), and dead bodies are pleasingly ragdolled all about the landscape. Will we ever get tired of watching our jump pack troops arc into the air on a pillar of fire, only to slam into the enemy and scatter both it the cover it was hiding behind? If we do, we'll know we've become tired of life itself.

Of course, for a lot of people multiplayer is the real reason to get the game, and those fans will be pleased to know that the small unit warfare of the single player campaign is not at all present in their field. Here the gameplay is more like the original, though again the choices of the player have a big impact on shaping their forces. From the get go, for instance, you must choose one of three army commanders, which in turn affect the way your army plays. For Marines, there's the choice of Force Commander, Apothecary (a medic analogue) or the highly technical Techmarine. Each brings unique abilities – the Apothecary, for instance, can heal your troops, while the expertise of the Techmarine makes for



better use of vehicles and defensive turrets.

Sadly, given our pre-release access to the game to be able to write this review on time, we've not had a huge chance to play much multiplayer. Then again, we do suck at online RTSes (Speak for yourself! -tech writer), so perhaps that's for the best!

Dawn of War II is a remarkable game. It's a sequel that surpasses the original in almost every way, providing a deep gaming experience for fans of the Warhammer world and neophytes alike. Long live the Emperor of Mankind!  DH

#### PC

Developer Relic Entertainment  
Publisher THQ  
Website [www.dawnofwar2.com](http://www.dawnofwar2.com)



Great voice acting; kinetic fights; power armour.



Some missions can get repetitive.



**Overall**  
Better than the original. We can't think of higher praise.

**94%**





# Codename: Panzers Cold War

Better dead than red, or pink, or some other morally suspect colour.

**C**odename: Panzers Cold War lies to you. It features neither Panzers – this is a conflict between the USA and Russia, not Germany – and the Cold War is pretty much ended during the opening cut scene, to be replaced by a remarkably hot war.

There may have been one or two Codename's mentioned in the game, though, but we're not certain.

Cold War features much the same basic gameplay as previous games in the series, but takes the combat into the alternate history dimension in this fictional blowing out of Russo-American relations in 1949. After a mid-air collision between a Russian jet and an American cargo plane – and a lot of rather pedestrian voice acting, Berlin becomes a battleground as the two powers duke it out for European supremacy. You'll predominantly be playing as the NATO forces, but three levels towards the end of the game will let you get your communist hat on.

There 18 maps in the single player campaign, and each has an array of main objectives and secondary objectives. There's often a couple of ways to approach each level, meaning that

some element of tactical thought is required to use your particular troop load out to its best ability. You can re-structure your command after each fight, place capturing certain Prestige objectives around each map also unlock reinforcements. Units, including some rather tough named characters, level up experience as you play, so you'll come to think rather fondly of some of your grunts, while possibly getting a little careless with more newly arrived troops.

War, after all, is hell.

When you combine the multiple paths of victory each map offers with the excellent Gepard 3 engine, you end up with a very vibrant and often changing battlefield. Heavy artillery can flatten whole blocks, vehicle wrecks burn and an exchange of grenades can leave buildings crumbling into the street, complete with bodies falling from the ruins if it happens to occupied.

There's an interesting synergy between units, as you'll need a good mixed formation to be able to handle the enemy. You'll want ammunition constantly supplied to frontline units like tanks, and infantry will be much happier getting into the fight if you take along a medic or two to keep them hale and healthy.

But all that said, Cold War's gameplay is a touch on the... uninspired side. Given the alternate history of the game's backstory, we were expecting a lot more from the game. Instead, it simply feels like earlier Panzers titles with a slightly more advanced weaponry, and even then this is only four years after WW2 ended. We would have much rather seen a Cold War title focus on the Fulda Gap and the classic scenarios of the 80s.

Though, perhaps, we've just read Red Storm

Rising one too many times.

The 20 multiplayer maps are a nice touch, and certainly the destructible battlefield will make for many varied online matchups, but in the end there's not much to really raise up Cold War from the larger field of top down RTS, especially when a game like Dawn of War II is on the scene at much the same time. If you absolutely feel the need to see Berlin pounded to rubble, this will appeal, but otherwise there are better games on the market. **DH.** 

## PC

**Developer** InnoGlow  
**Publisher** Atari  
**Website** [www.atari.com.au/games/](http://www.atari.com.au/games/)

**Graphics**  
Great physics engine.

**Gameplay**  
A touch repetitive and lacking imagination.

**Sound**  
Won't somebody think of the voice-actors!

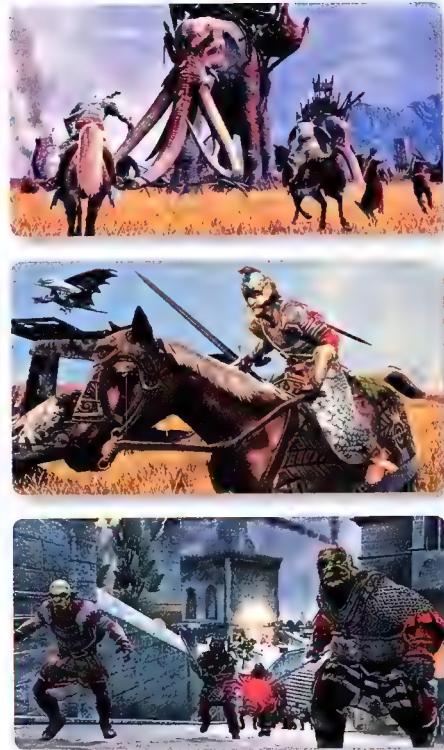
**82**  
**72**  
**70**



**Overall**  
A clear case of the whole being far less than the sum of its parts.

**73%**





# The Lord of the Rings [PREVIEW] the Rings: Conquest

Take up your sword in defence of Middle Earth. Or not...

**T**he Lord of the Rings. To many geeks and nerds and ne'er-do-wells the likes of which read *Atomic*, it's the Holy Grail of fandom. Following the success of Peter Jackson's epic films, it's now got a far broader appeal; this can be great, if you've always wanted action figures of Aragorn and Gimli to do dirty things to, but rather awkward when you see what many consider one of the great works of fantastic literature reduced to a mere franchise.

So where does Conquest fall in this? Work of immersive art or embarrassing example of a property pushed too far? Well, before we get too ranty – and we will – let's sum up what the game's about.

If you've played any of the *Star Wars: Battlefront* games, you're pretty much on top of things. It's like that, but with swords and arrows instead of blasters. It's ostensibly a multiplayer game, featuring up to 16 players online (confirmed for the console version, though that seems low for PC), battling around locations like Minas Tirith, The Shire and other familiar names from the books. There is a single player portion, with both Evil and Good campaigns, but



the AI is sketchy at best. Really, the single player stuff serves more as an extended tutorial than anything of real depth and storytelling.

No, the meat of the game is in competitive play, and here you'll have four classes to choose from before you spawn... I mean, march into battle.

The Warrior is your classic sword-swinging, with a slew of attack combos and a ranged throwing axe attack. The Archer is, well, an archer, capable of firing both normal and firey arrows; they're also backed up by a secondary kick attack. There's also a Scout class, which any Rogue-style MMO player would be familiar with, chock full of nasty damaging strikes and with the ability to stealth. Finally, there's... a Mage class. Lightning, healing all that heavy duty magicking stuff – but a real glass cannon. There are also special characters, like the Fellowship and the Nazgul that can be unlocked by achieving map-based objectives.

The classes balance well enough, but due to the close in nature of a lot of levels and classes, gameplay can feel very hectic and difficult to keep track of. Maybe it's early days, and the regular tactics these games rely on to add complexity and depth are yet to develop, but most fights seem little more than brightly coloured brawls. One of our engagements in particular was frustrating: a level set in the Shire (taken from the final stages of the Evil campaign), where Orcs overrun the land of the Hobbits. Before the side of Good even knew what was going on the place was on fire and a Balrog was stomping around the place... A Balrog. We're as happy to suspend a certain level of disbelief as the next fanboy, but that just

seemed too much.

We've yet to see final code, of course, though we have spent time with the Xbox Live demo. So far things might get a little tighter on the PC, but so far it really seems that this is a game stuck between two opposing ideals. On the one hand, it's a new take on *The Lord of the Rings* that EA can push at fans who'll buy anything with Hobbits attached; on the other, though, you've got the fact that melee games like this aren't exactly popular – the button-mashing controls necessary just don't lend themselves to keeping track of multiplayer engagements.

We're very keen to be proven wrong on this one, but so far this is looking very far from the one game to rule them all.  DH

PC, 360, PS3 and DS (previewed on PC and 360)

Developer Pandemic Studios

Publisher Electronic Arts

Website <http://pandemicstudios.com/conquest/>



Some evocative level design; Weta Workshop assistance on models; stirring soundtrack



Overly hectic action; poor class choices; low player count; not really LotR



Overall:

Not an ideal way to experience Middle Earth.

**68%**



# The Godfather 2

An offer that quite possibly should have been refused...

The first Godfather game managed to drive fans of the classic Coppola films into an uproar, while at the same time being a mildly popular take on the sandbox-crime-spree genre made so popular by GTA. Apparently rage and near-mediocrity are like a red flag to EA's raging bull, and so we find ourselves in the mobbed up company of The Godfather 2.

On paper, there's actually some stuff that this new iteration has that you might look forward to. For movie fans, the fact that character actor Robert Duvall reprises his role as Corleone family advisor Tom Hagen might excite. For those who like a touch of strategy in their sandbox, the Don's View offers a top down cityscape where you can post guards on your various nefarious operations and plan future hits and shakedowns, as well as promote and tweak your growing crime family.

And, of course, there's the nigh-unresistable lure of driving around town with scant regard for road laws, fire hydrants and pedestrians that typifies all sandbox games, set against the backdrop of the second, even darker middle film of the Godfather Trilogy.

The game opens promisingly enough, with a rather wordy introduction the Corleone family's latest racket – making a mess of money in Cuba alongside a more or less corrupt (and soon to be defunct) Cuban government. It's very film-accurate, as Hyman Roth congratulates all

the mobsters concerned on their new found business wealth, but goes off the rails a touch when Michael Corleone starts talking – obviously, Al Pacino does not care to lend his voice nor even his likeness to the game. In fact, the quietly spoken and darkly menacing original take on Michael seems to have been replaced with something just shy of a mobster caricature.

Disappointing.

Of course, it all goes to hell as revolution grips Cuba and you've got to escort Michael and your own boss to the airport. It's a pretty good lead in to the mechanics of the game, and as training levels go it does a good job of getting you used to the game and introducing the setting.

The problem is that it falls into the same trap that the first game does – namely, that if you're at all a fan of the films then the idea of Michael Corleone blasting away at rebels on a blood-drenched escape to the airport, complete with snipers, is a touch... alarming, shall we say.

From that point, the game introduces you to more elements, especially the Don's View, as you are tasked with taking over New York, one illegal business and money laundering front at a time. This too is bit of a training level, and it does some interesting things with the sandbox game. You start recruiting your own made men, and can choose from a range of specialists – demo guys, medics, all the usual stuff – that you can either post at your joints, or have follow you around town as you bully, coerce and generally scare the ever-loving crap out of otherwise honest businessfolks.

This is the Black Hand 2.0 control scheme, introduced in the first game, but largely expanded here. Now you can use both control sticks (we reviewed Xbox code) to grab, shake, headbut, or groin-kick your targets, and do even more in the right context. Roughing up a barman at his bar? Slam his head into it. Got someone

on a rooftop? Try dangling him over the long drop.

It's an interesting scheme, but possibly a little too... effective. We don't mind a degree of escapism in our games, and violence is practically part of our gaming DNA these days, but the intimidation in Godfather 2 left us feeling more than a little guilty. It's possible to discover that some of the people you're trying to intimidate have weaknesses; handy, to a degree, but discovering that a woman is afraid of being beaten, and then needing to hit her to get the job done, simply left us feeling dirty.

And not in a good way. **DH.** 

PC, 360, PS3 (reviewed on 360)

**Developer** EA Redwood Shores  
**Publisher** Electronic Arts  
**Website** [www.ea.com/godfather2/](http://www.ea.com/godfather2/)

**Graphics**  
 A little sparse, but perfectly serviceable.

79

**Gameplay**  
 Varied, but at times... lacking in taste.

71

**Sound**  
 Good use of music, mostly solid voice acting.

79



**Overall**

A game that should be better than it is, but that doesn't make it so.

**68%**



THINGS  
TO SEE

# The Girl Who Leapt Through Time

Director Mamoru Hosoda

The ability to mess around with the natural ebb and flow of time has been something that many have dreamed about, and if you can infer anything from the title, you'll know that this movie deals with just that. Produced by Madhouse (best known for the Death Note series) and released it's only just recently been released in the western world for our viewing pleasure.

Through a very strange twist of fate the protagonist, Matoko Konno, accidentally activates a device left in her school's science lab as she trips over it, granting her power to 'time-leap'. Unbeknownst to her at the time, she discovers this power when she manages to avoid a potentially fatal and gruesome accident – resetting time back to a previous point in her life.

Naturally, she doesn't just use this power for helping herself, but eventually uses it to shape and mould her life selfishly without care for the consequences. She continues along her irreverent path, cutting a swathe through the timeline, until she faces problems that changing history just won't help, and her actions actually make it worse. Beginning to realise that using this power for her personal gain isn't going to help her friends, she sets about to improve not only her life, but theirs.

Touching on the concepts of unavoidable events (such as love, and certain things that must happen), how to maintain sanity when you've rewound a karaoke session so that you've been singing for ten hours straight (we're so not kidding here), and whether or not a rice pudding could



be the focal point for the whole movie, it's very unpredictable. A benefit of that of course is that it doesn't really get boring, and the action managed to keep us entertained throughout the whole 98 minute viewing time.

The animation in this is great, with bright vivid colours, rich settings and very good movement. Backed up by great writing and an inventive plot, added to by very appropriate and engaging sound, there are many moments that we actually stopped breathing out of shock, laughed from joy, and wondered just what it'd be like to be in Matoko's position. We'd probably just wind up going back in time and annoying key members of history (nothing more satisfying than slapping Genghis Khan around a bit), but even that wouldn't be quite as enjoyable as this film.

This is a subbed (subtitled) release, and all the dialogue is in Japanese, which is the only real way to watch anime.  JR

NEW ANIME  
RELEASES

## February

CLAYMORE V1

DRAGON BALL Z REMASTERED MOVIE COLLECTION (UNCUT) V3

DRAGON BALL Z REMASTERED UNCUT SEASON 7

SCHOOL RUMBLE SECOND SEMESTER COLLECTION 1

SCHOOL RUMBLE SEASON 1 COLLECTION

NEGIMA SPRING &amp; SUMMER SPECIAL (OVA)

GRAVITATION OVA: LYRICS OF LOVE

## March

NARUTO THE MOVIE 2: LEGEND OF THE STONE OF GELEL (2 DISC)

AH! MY GODDESS SEASON 2 FLIGHTS OF FANCY COLLECTION

BECK: MONGOLIAN CHOP SQUAD COLLECTION

BLACK BLOOD BROTHERS COLLECTION (SLIMPACK)

BLACK LAGOON SEASON 1 COLLECTION

BLEACH V13

CODE GEASS: LELOUCH OF THE REBELLION V3

SHAKUGAN NO SHANA SEASON 1 COLLECTION

TSUBASA CHRONICLES (TV) V09

MADMAN  
ENTERTAINMENT

# Fallout

David Hollingworth and James Matson continue their chat about the ongoing state of the MMO scene. This month... Lord of the Rings, Star Trek and Stargate Worlds.

**JM:** The missing capital cities (in Warhammer Online) were a bit of a bastard, huh? Although recent content patch this month will address the classes not included at launch, something that's sure to be a hit with existing players. I guess War is a love it or hate it affair, like most MMOs, there's just no middle ground. I can tell you place a lot of stock – rightly so – in the richness of the storyline, character interaction and so on. Are those things strengths of Lord of the Rings Online? (having never played it myself.) Me, I'm in a simpleton phase right now, I like picking up ridiculous looking swords, axes or glowing hammers and beating the shit out of fantasy stereotypes until they're bleeding from every orifice.

That's Warhammer.

I learnt to be honest with myself about what I actually want for my monthly MMO subscription now, after holding onto the dead horse that was Vanguard: Saga of Heroes for longer than I should have, wandering aimlessly amongst a lifeless, buggy world with no clear idea why I was handing over money each month. EverQuest 3 my arse.

So sell me Lord of the Rings Online, pitch it to me. I'm reasonably savvy about the lore, but the MMO itself somehow snuck under my radar never to re-surface.

**DH:** It's a two fold thing, really. For one, it's Lord of the Rings, and two, it's Lord of the Rings done quite well.

It could be argued that more than an MMO, it's actually a single player game you happen to share with a whole lot of other people. PvE is very much the focus, and the Epic plotlines actually weave you into the story of the Fellowship – you give advice to Frodo, help in the re-forging of Aragorn's sword and more besides. Sure, there's also the usual crop of kill X of Y and bring me their Zs, but the level of atmosphere and reverence for the source material is quite impressive. It has also has a much more mature player-base, and it's very rare to find people who haven't taken some level of care in



naming their toon.

Lots more RP, as well. Yeah, yeah, I'm a geek.

Essentially it is very much WoW for grownups with a more literary bent, even down to a lot of the mechanical side of things. If you've played WoW, a lot of the gameplay of LotRO will feel very similar. But there's a lot of innovation besides, especially in the latest expansion. In particular I'm loving the Legendary Item system from Mines of Moria, which makes the gemming and enchanting of WoW look pedestrian by comparison. Getting the chance to name your own gear, and then level it up like a character itself, picking skills and stat bonuses, is a lot of fun.

But that's what we're playing now. You looking forward to anything coming out in the next little while? Are you as excited/terrified as I am about the Trek MMO?

**JM:** It sounds like you appreciate LOTR for the same reason I still hold onto EverQuest 2. Polish, atmosphere, mature fantasy content and an attention to detail from developers and players that seems lacking in Blizzard's hugely successful offering. Three cheers to us for being fantasy snobs of the highest order. Next stop, wine tasting and the theatre!

Honestly I'm probably more terrified of the next Trek movie than the Trek MMO. In film or television I'm an even split when it comes to Sci-Fi and Fantasy, but with

MMOs I gravitate towards enchanted daggers, Necromancers and Dragons more than phasers and prime directives. Also, Trek has had a pretty solid history of fantastic games being spawned from the franchise, some of my greatest gaming memories are peppered with Star Trek: Armada, Elite Force and Away Team. I'll start chewing up the pre-release media for Star Trek Online closer to release date, but for now I'm keeping a keen eye on Stargate Worlds. It was off again on again for a while, but there's every indication that Cheyenne Mountain Entertainment are going to take players on a seriously shiny tour of the Stargate system, Asgard and all.

Stargate has picked up the torch that Star Trek burned so brightly for so long, and carried it through a major motion film, two TV shows and some reasonably solid direct-to-DVD movies, it is – for all intents and purposes – the place to be as far as Sci-Fi is right now. The class archetypes are shaping up well, with careful thought given on how to extend the singular character types seen in Stargate SG1 into generic playable classes, and although most of the available media is very 'Beta' looking, the title still seems to have a solid 3D engine behind it (a must for simulating that all important shimmering wormhole effect.)

Yeah, bring on Stargate: Worlds, if that's done right, I won't be too fussed about Star Trek Online... TBC

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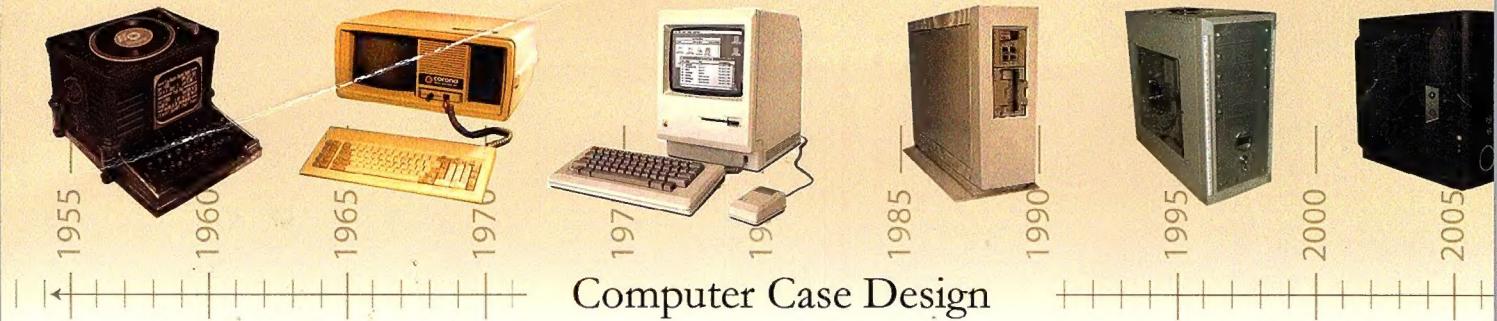


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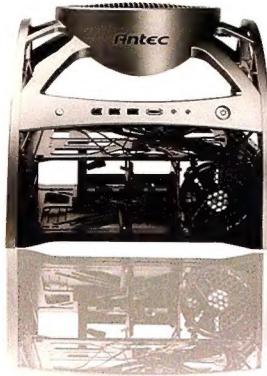
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